

**SEEDING CHANGE? IMPROVING AND UNDERSTANDING
HOUSEHOLD FOOD SECURITY IN A NUTRITION-SENSITIVE
AGRICULTURE PROGRAM IN MALAWI: A MIXED-METHODS STUDY**

by
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Abstract

Background: Nutrition-sensitive interventions have been promoted as a way forward to address structural causes of malnutrition. These are programs that pair actions to improve nutrition with other sectors such as agriculture, education or health. However, there is mixed evidence on the impacts of agriculture-based programs. **Methods:** This study used a mixed-methods approach to address questions regarding the impacts of a nutrition-sensitive agriculture program (NEEP) on household food security, resource-sharing and women's care capacity. **Results:** No program impacts were found a year later on two measures of household food security (HDDS, HFIAS), although a significant impact was found in reducing the severity of household coping strategies during the lean season. Secondly, social obligations, reciprocity, and village governance play an important role in determining resource allocation and reveal a morality of sharing during periods of food insecurity. Sharing practices were determined by factors such as the origin and type of resources, as well as by the influence of local leaders. Moral economy dynamics affected the sharing of aid and community perceptions of interventions. Thirdly, women's participation in NEEP was examined to determine if voluntary program activities added to the burden of care. The program significantly increased time spent caregiving for female participants, but this effect held only during the lean season. However, quantitative increases in time spent in care were small and were not considered burdensome. Further, contributions to the program were viewed as qualitatively important to participants. Programs aligned to community norms are able to capitalize on existing dynamics without generating social division or conflict. **Conclusion:** The NEEP program adds to the body of literature on nutrition-sensitive agricultural programs, showing potential for an intervention design based on community contributions through preschools. This program aligned to local norms and expectations, avoiding the imposition of what participants deemed to be undue voluntary burdens while also providing protective effects to households during periods of vulnerability.

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List of Abbreviations

ADC	Area Development Council
BCC	Behavior Communication Change
CA	Conservation Agriculture
CBCC	Community-based Childcare Center
CSI	Coping Strategies Index
DFID	Department for International Development, Government of United Kingdom
DHS	Demographic and Health Survey
DID	Difference-in-Difference
ECD	Early Childhood Development
FCS	Food Consumption Score
FEWSNET	Famine Early Warning Systems Network
FFW	Food for Work
FISP	Fertilizer Input Subsidy Program
FSP	Formal Social Protection
GVH	Group Village Head
HDDS	Household Diet Diversity Score
HFIAS	Household Food Insecurity Access Scale
IDI	In-depth Interview
IFPRI	International Food Policy Research Institute
IHS	Integrated Household Survey
IMMANA	Innovative Methods and Metrics for Agriculture and Nutrition Actions
IRB	Institutional Review Board
ISP	Informal Social Protection
ITT	Intention to Treat
IYCF	Infant and Young Child Feeding
LNS	Lipid-based Nutritional Supplement
LSMS	Living Standards and Measurement Survey
MASAF	Malawi Social Action Fund
MDAT	Malawi Development Assessment Tool
MoGCSW	Ministry of Gender, Children and Social Welfare, Government of Malawi
MVAC	Malawi Vulnerability Assessment Committee
NEEP	Nutrition Embedding Evaluation Program Intervention
NEEP-IE	Nutrition Embedded Evaluation Program Impact Evaluation
NGO	Non-Governmental Organization
OPHI	Oxford Poverty and Human Development Initiative
OFSP	Orange-fleshed Sweet Potato
RCT	Randomized Control Trial
SAM	Severe Acute Malnutrition
SCTP	Social Cash Transfer Program

SUN	Scaling Up Nutrition Movement
TA	Traditional Authority
VDC	Village Development Council
VSL	Village Savings and Loan Group
UNICEF	United Nations International Children’s Emergency Fund
USAID	United States Agency for International Development
WALA	Wellness and Agriculture for Life Advancement Program
WEAI	Women’s Empowerment in Agriculture Index
WFP	World Food Program

CHAPTER 1: INTRODUCTION

Worldwide, malnutrition contributes to forty-five percent of deaths of young children (Black et al., 2013). Fourteen percent of deaths of children under five years of age are attributable to stunting and nearly twelve percent are attributable to wasting (Black et al., 2013). In 2016, global estimates of the prevalence of children under age 5 that suffered from stunting was 23%, and the prevalence of childhood wasting was 8% (Development Initiatives, 2017). In addition to the relationship between mortality and malnutrition, there are linkages between malnutrition and infection. Malnutrition has detrimental impacts on cause-specific mortality for highly prevalent conditions such as diarrhea and acute respiratory illness (Rice et al., 2000). These statistics reveal a stark truth: each year millions of children die from conditions that are potentially preventable through improvements to nutrition. Countries in the developing world shoulder the great majority of this burden. Further, rural areas suffer more from stunting and nutritional deficits. Among 81 countries, stunting is 1.45 times higher in rural areas than in urban areas (Black et al., 2013). Sub-Saharan Africa has the highest mortality rates for children five years of age and under and is disproportionately affected by malnutrition. In 2014, fifty-eight million children under five years of age in Africa were affected by stunting (Haddad, 2016). While global prevalence of stunting has declined from 190.6 million (35% of children) in 2004 to 173.7 million (30% of children) in 2010 (Lu et al., 2016), the prevalence of stunting in Sub-Saharan Africa increased. Since 1990, the number of stunted children in Sub-Saharan Africa increased from 23.6 million to 26.9 million (Alderman & Sahn, 2016). The current prevalence of stunting in children in the region (38%) is among the highest globally (Lu et al., 2016). Similarly, in Malawi, an impoverished country in Southern Africa, malnutrition and child mortality have remained stubbornly high despite significant efforts by government and international organizations.

This research will address food security issues affecting the underlying drivers of chronic malnutrition of young children in Malawi. These problems are exacerbated by household vulnerability and seasonal hunger (Devereux et al., 2006). Agriculture plays a central role in Malawi's economy and in the maintenance of rural livelihoods. Nearly 85% of all households in Malawi are engaged in agriculture - in rural areas that number reaches 94%, with the majority surviving through subsistence agriculture. Further, households have very small landholdings upon which to cultivate - 68% of households engage in agriculture on plots smaller than 2 acres (Republic of Malawi, 2012). Agriculture is critical to the survival of rural Malawians and to addressing problems of food insecurity and malnutrition.

Interventions to prevent or mitigate malnutrition have been found to have additional non-nutrition related impacts including improved grade attainment and progression, increased scores in reading comprehension and on cognitive tests and better wage earnings (Hoddinott et al., 2008). “Nutrition-specific” interventions directly target the immediate causes of malnutrition through programs such as micronutrient fortification or food supplementation. While directly targeting the immediate causes of malnutrition is essential to ameliorate its physical manifestations, malnutrition cannot be eliminated without addressing its structural causes. To address the structural causes, “nutrition-sensitive” interventions have been promoted as a way forward – these are programs that pair actions to improve nutrition with other sectors such as agriculture, education or health. Studies show that scaling up nutrition-specific interventions could lower undernutrition by as much as 20%, but to achieve more dramatic effects, nutrition-sensitive approaches to target the underlying causes are necessary (Bhutta et al., 2013). These multi-sectoral programs may address both underlying and basic causes of malnutrition by acknowledging the social, economic and political roots of the problem (Ruel et al., 2013). Different intervention types and designs have been tested to improve nutrition outcomes, but there is limited evidence on the impact of agriculture-based programs on

nutrition outcomes (Ruel et al., 2013). Nutrition-sensitive agricultural programs aim to maximize nutrition outcomes by integrating the agricultural livelihood activities of poor households with nutrition activities such as school meals. Practitioners and researchers in the nutrition community have long sought innovative program designs with the potential for substantial impacts on child growth and other outcomes. These nutrition-sensitive agricultural programs show promise in improving food security, child nutrition and household economic outcomes.

In an effort to address the challenge of malnutrition in Malawi, the international non-governmental organization (NGO) Save the Children implemented a nutrition-sensitive agricultural intervention in the Zomba region. The Nutrition Embedding Evaluation Program (NEEP)¹ was based on program theory from conceptual linkages between agriculture and nutrition. The intervention integrated agricultural and nutrition education activities through community-maintained early childhood development centers, Community-Based Childcare Centers (CBCCs). The NEEP intervention directed nutrition-related activities including knowledge promotion through trainings and CBCC-based strengthening activities such as the creation of school gardens and support for school meal preparation. Agricultural program activities included production trainings and the provision of agricultural inputs and small livestock. Agricultural activities were designed to improve production and to expand market engagement to increase household access to diverse foods and income. Nutrition activities supported the provision of nutritious CBCC meals to increase children's attendance and diet diversity, improving knowledge and decision-making around nutrition to support child development and nutrition (Gelli & Roschnik, 2014).

The NEEP intervention was co-designed with an impact evaluation called the “NEEP-IE” (Nutrition Embedding Evaluation Program – Impact Evaluation). NEEP-IE was planned in partnership with Save the Children Malawi, which provided staff, funding and supervision of the

¹ Nutrition Embedding Evaluation Program (NEEP): <http://sites.path.org/mchn/our-projects/nutrition/neep/>.

NEEP program. NEEP-IE, conducted by the International Food Policy Research Institute (IFPRI), was an evaluation of the NEEP intervention over the period of one year. This dissertation research was nested within the NEEP-IE parent study. This study used a multi-phase mixed-methods approach to measure program impacts on household food security and to explore how the intervention may affect or be affected by dynamics of resource-sharing and women's care burdens.

Research Aims

The goal of this research was to *evaluate selected intended and unintended food security impacts of a nutrition-sensitive agricultural intervention based around a community-based early childhood development program (ECD)*. This study utilized a mixed methods approach nested within a parent study (NEEP-IE) randomized control trial (RCT). The mixed-methods approach provided explanatory depth not typically incorporated into RCTs. Research aims were developed with the understanding that program impacts may be affected by dynamics that cannot be easily captured in quantitative data. For example, food security may be improved by increasing access to food at the household level, however, if households share or gift food or fungible resources to others, improvements may prove to be more modest than expected. Further, the NEEP intervention required voluntary investments by households. While some of these contributions were in-kind (community provision of school meals), much of the household-level investment occurred through participation in program activities such as trainings, meal preparation, and construction or maintenance of CBCC facilities. Aims 2 and 3 were designed to deepen understanding of the results of Aim 1, and to explore potential unintended consequences in order to improve program design.

Aim 1. To evaluate the effects of the NEEP intervention on household food security.

Hypothesis 1: The NEEP integrated agriculture-nutrition intervention improves household

food security by improving household food access and availability.

Aim 2. To explore how sociocultural dynamics influence household food security in rural agricultural households in Malawi.

Justification: Sociocultural dynamics are important to understand why some households may be more vulnerable to food insecurity, affecting which resources are shared and with whom.

Aim 3. To assess program-related shifts in female caregiver time allocation and to investigate women's perceptions of the potential time burdens of program participation.

Hypothesis 3: The NEEP participatory model increases the burden of time spent in caregiving by female participants; however, quantitative changes may not be perceived as qualitatively important.

Summary

The organization of this dissertation will be as follows: the introductory chapter is followed by Chapter 2, which presents the overarching conceptual framework, study context, description of the program intervention and broader parent study, as well as the literature review for the papers to follow in Chapters 3-5. Chapters 3-5 contain stand-alone research papers which address research aims 1-3 in chronological order: Chapter 3 addresses Aim 1, Chapter 4 attends to Aim 2, and Chapter 5 pertains to Aim 3. Chapter 6 draws broader conclusions from the results of all three papers, providing policy recommendations and outlining contributions to the scientific literature.

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CHAPTER 2: BACKGROUND

This chapter presents background information related to the study organized into sections. In the first section, a theoretical framework for the study is presented, followed by a description of the setting to provide context. This is followed by a description of the intervention and the parent study, NEEP-IE, in which this dissertation research is embedded. The subsequent section provides an overview of the methods used in the dissertation. In the final section, the broader scientific and programming literature regarding each research aim is addressed in turn.

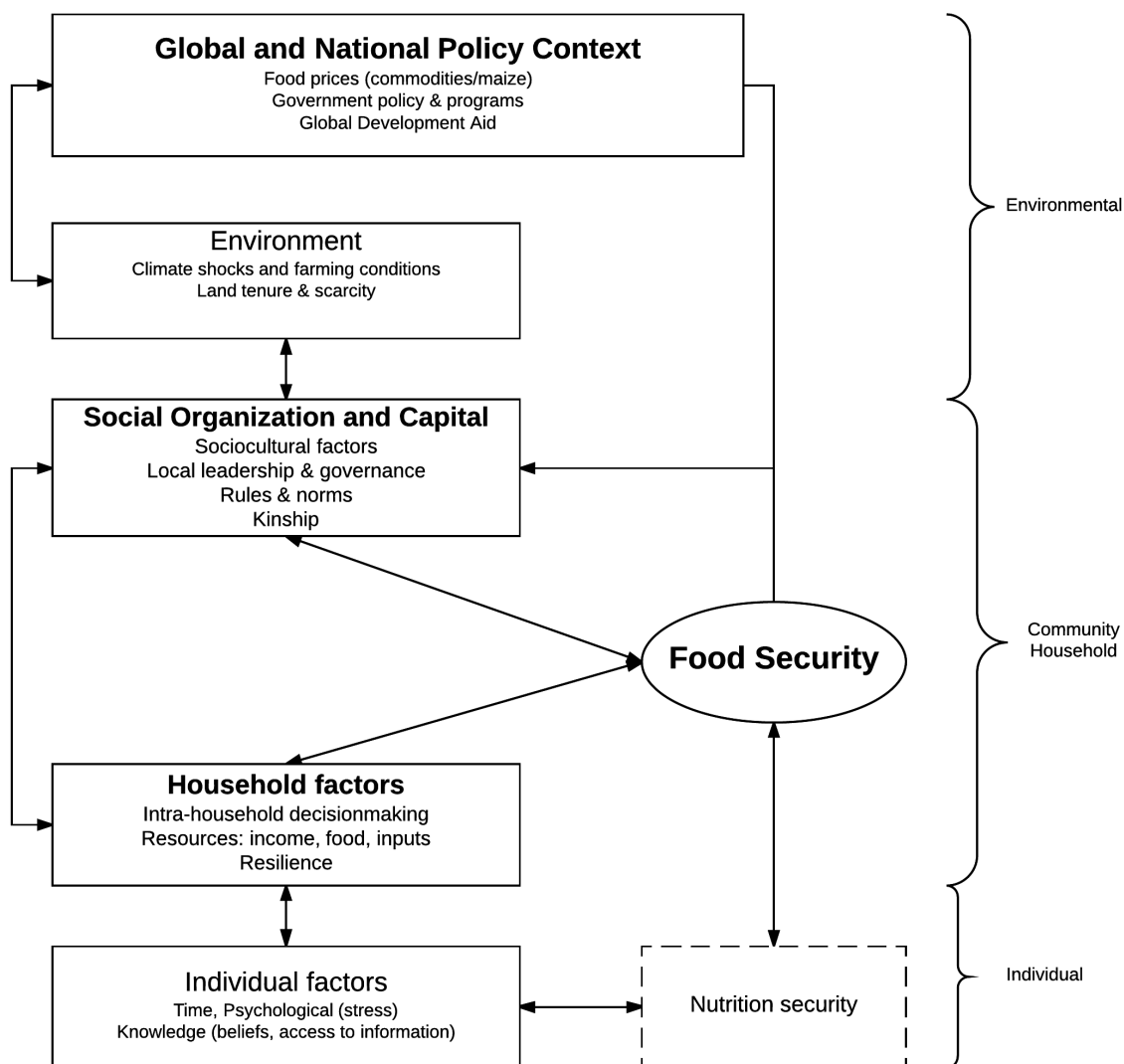
Conceptual Framework

This study was based on a *pragmatist* epistemological tradition, as it incorporated practical concerns and the possible presence of multiple realities instead of one truth (Creswell & Clark, 2011). Likewise, the researcher is a *methodological situationalist* in equally valuing quantitative and qualitative methodologies. Certain methods are appropriate depending on the research question, thus the study is situated in *methodological situationalism* (Ponterotto & Grieger, 2008).

The conceptual framework for this dissertation (Figure 1) explicates relationships between factors influencing food security and nutrition. The framework includes the role of social organization and capital to determine resource availability and accessibility. This diagram explains how resources are used or diverted towards the maintenance of a food secure environment, and ultimately improvement of individual nutrition behaviors. This conceptual model frames the three research aims of this dissertation across three levels (environmental, community/household and individual). Components highlighted in black indicate the factors and relationships of interest. The dotted line around nutrition security indicates that the concept was not examined in this dissertation. However, it is important to include it in the framework to map relationships between nutrition security and other key concepts. Nutrition security is determined by access to adequate food, care

and feeding, and sanitation and health. Food security is a necessary but not sufficient condition of nutrition security. Nutrition security was measured by nutritional behaviors and status in the parent study. Research aim 1 measured program impacts on household food security, seen here as availability and accessibility of food at the household level. Aim 2 investigated relationships between social organization/capital and household resources – or the availability and accessibility elements of food security. Finally, the third research aim assessed individual-level resources, in the form of time as a proximal outcome, to understand how program participation affected female caregivers.

Figure 1. Conceptual model



Study Context

The Malawian economy is primarily agricultural, and food security problems are exacerbated by the increasing pressures of population growth, land scarcity and depleted soils (Carr, 2014), as well as by the effects of climate change. Smallholder farmers, a majority of Malawi's population, are increasingly vulnerable to these pressures. Seasonal hunger occurs during the agricultural "lean" period prior to harvest when poor households have depleted food reserves. Cyclical hunger is punctuated by shocks such as weather events or the deaths of household members; events which can trigger irrecoverable declines in household welfare. Rankings on five different indicators of vulnerability to shocks indicate that Malawi is among the 11 most vulnerable countries in the world (Barrett & Headey, 2014).

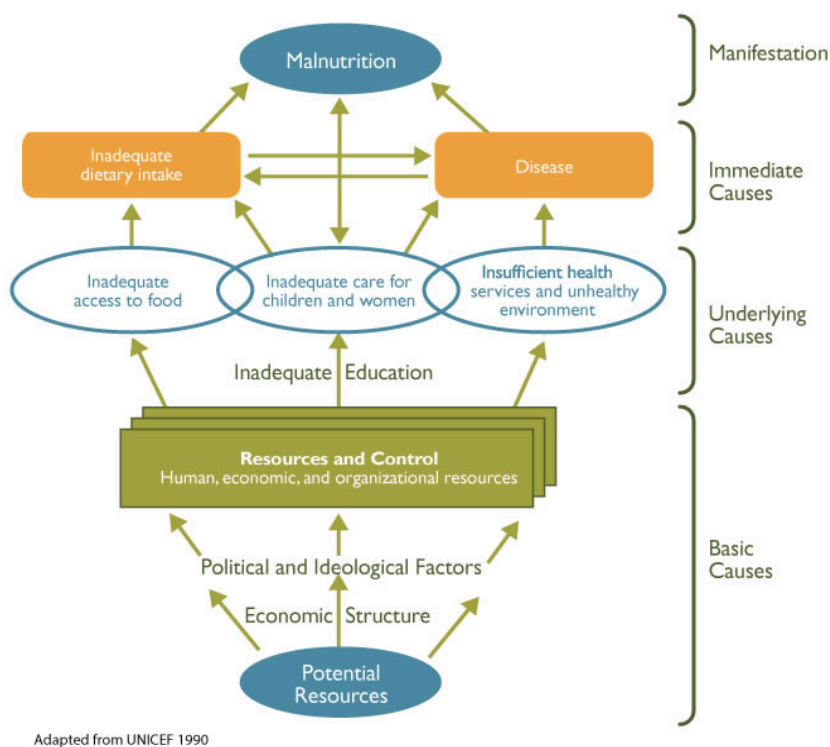
The diets of smallholder households are based on cultural preferences for a low-nutrient maize-based diet (Dickenson et al., 2009). Access to this staple food and norms dictating its distribution are thus essential to understanding food security in this context. Malawian smallholder villages also received a significant influx of foreign aid in recent decades to address natural disasters and food insecurity. Malawi received USD\$1.05 billion in net official development assistance in 2015, composing 16.9% percent of gross national income (The World Bank, 2017).

Malnutrition in Malawi

Malnutrition is a health condition resulting from a lack of sufficient energy, micro- and macronutrients in order to sustain growth, physical activity, bodily function and intellectual capacity. Malnutrition is highly problematic during childhood, as the consequences of malnourishment in early years, particularly during the first 1,000 days, affect long term development in areas such as stature, cognitive development and school achievement (Alderman et al., 2006). There are many causes of malnutrition, most of which can be separated into tiers: proximate/immediate

(biomedical), intermediate/underlying (behaviors that increase exposure to biomedical causes), and inclusive/basic (social, economic, political and cultural milieu in which proximate and intermediate causes occur) (Ferguson et al., 1990). A widely used framework for understanding malnutrition originates from UNICEF (United Nations International Children’s Emergency Fund, 1990). The UNICEF framework is shown in Figure 2. The framework depicts the underlying causes of malnutrition and the broader environmental factors, principally political and economic forces that affect resources and control of households and individuals to be able to ensure their own health and nutrition. These factors affect underlying causes that limit access to food and healthy lifestyles, in turn affecting the immediate causes of malnutrition; inadequate dietary intake and recurrent disease.

Figure 2. UNICEF Framework for Causes of Malnutrition



Malawi has among the highest prevalence of child chronic malnutrition in the world; in 2010 almost half (47%) of children under age five were moderately or severely stunted (Republic of Malawi, 2011b). The 2015-16 Demographic and Health Survey (DHS) showed that 37% of children

under five years of were stunted, 11% were severely stunted and 3% suffered from wasting. In addition, an inverse relationship was found between mother's education, wealth and child stunting (Melorose et al., 2015). A higher prevalence of stunting was found in rural areas (39%) as compared to urban areas (25%) (Republic of Malawi, 2011a). The study location in Zomba district had an under five mortality rate of 134 per 1,000, which was above the national average, and furthermore 23% of child mortality can be associated with malnutrition (United Nations Office for the Coordination of Humanitarian Affairs, 2014). The contribution of malnutrition to child mortality in Malawi is very high, with approximately 50% of all deaths of children under five years of age related to severe or moderate malnutrition. No significant improvements to the contribution of malnutrition to child mortality in Malawi have occurred since 1992 (United Nations International Children's Emergency Fund, 2008). In 2015, the child mortality rate in Malawi was 64 per 1,000 live births. In comparison, the child mortality rate in Africa was 81 per 1,000 live births. Globally, the child mortality rate was much lower, at 43 per 1,000 births². Malnutrition in Malawi is strongly affected by persistent food insecurity, which is caused by factors such as food prices, seasonality, climate shocks, political and economic dynamics. This study focused on the underlying causes that contribute to the immediate causes of malnutrition.

Food security, seasonal hunger and gender in Southern Malawi

The study area in Zomba District is characterized by rural poverty. Seasonal hunger is a persistent, cyclical problem. Weather and seasonality add to Malawi's vulnerability to shocks. The seasonal hunger period was particularly severe in 2015-2016 in the Southern and Central regions of the country which include Zomba. Poor maize harvests resulted from the deleterious effects of

² Global Health Observatory (World Health Organization), Under-Five Mortality: http://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/.

climate change and the strongest El Niño in 25 years. Drought effects lasted beyond March of 2017³. These exceptional drought conditions added to already difficult growing conditions from cyclical weather patterns. Agricultural production was limited by the typical extended dry season and intense rainy period from November-April. During this period, 95% of all yearly precipitation falls – a pattern which has led to consistently poor yields (Dickenson et al., 2009). Seasonality also affected the availability of fresh produce and market price fluctuations precluded access to nutritious foods. Some foods nearly tripled in price during the lean season - and local markets were not capable of providing consistent access to nutritious food due to limited infrastructure, little product variety, insufficient volume, and price competition (Gelli, Donovan, et al., 2018).

Malawi has had a history of food crises generated by price hikes, maize shortages, government mismanagement and policy failures. The most dramatic of these crises occurred in 2001-2002. This period was characterized by high rates of mortality from hunger and was followed by subsequent famines in 2005-2006 and 2007-2009. The subsequent famines had lesser mortality in part due to the support from social protection programs from newly created assistance bodies such as the Malawi Vulnerability Assessment Committee (MVAC) and the Malawi Social Action Fund (MASAF)(Ellis & Manda, 2012).

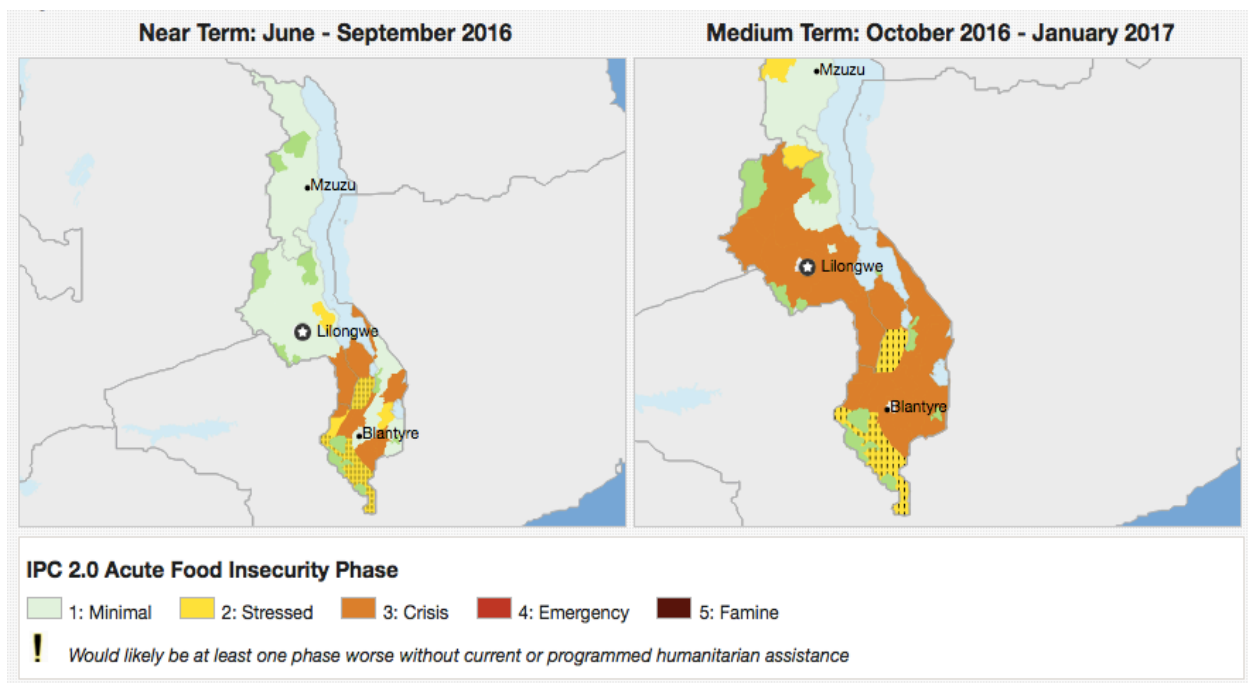
These efforts by Government and humanitarian organizations played an essential role in ameliorating hunger and cyclical food insecurity. However, such programs have proven ineffective in the sustained, long-term prevention of hunger or in improving household resilience, particularly during the lean season. The 2015-2016 agricultural year in Malawi was deemed one of the worst periods in terms of food security in the past decade⁴. The Famine Early Warning Systems Network

³ “Southern Africa cries for help as El Niño and climate change savage maize harvest.” (26 Nov 2016). The Guardian. <https://www.theguardian.com/global-development/2016/nov/27/southern-africa-climate-change-drought-crop-failure-img-1>.

⁴ Malawi Humanitarian Situation Report, No. 10. (Oct 2016). UNICEF. <http://reliefweb.int/report/malawi/unicef-malawi-humanitarian-situation-report-no-10-october-2016>.

(FEWSNET) reported that the study area was considered a “stressed” region due to climatic shocks as well as diminished production of cereals. During this period, FEWSNET maps showed increased food insecurity, particularly in the southern region, with the Zomba region in crisis. These maps are shown in Figure 3, with Zomba located proximate to Blantyre and west of Lake Chilwa.

Figure 3. Food Security Outlook for Malawi, 2016-2017



Source: FEWSNET, September 2016 ⁵

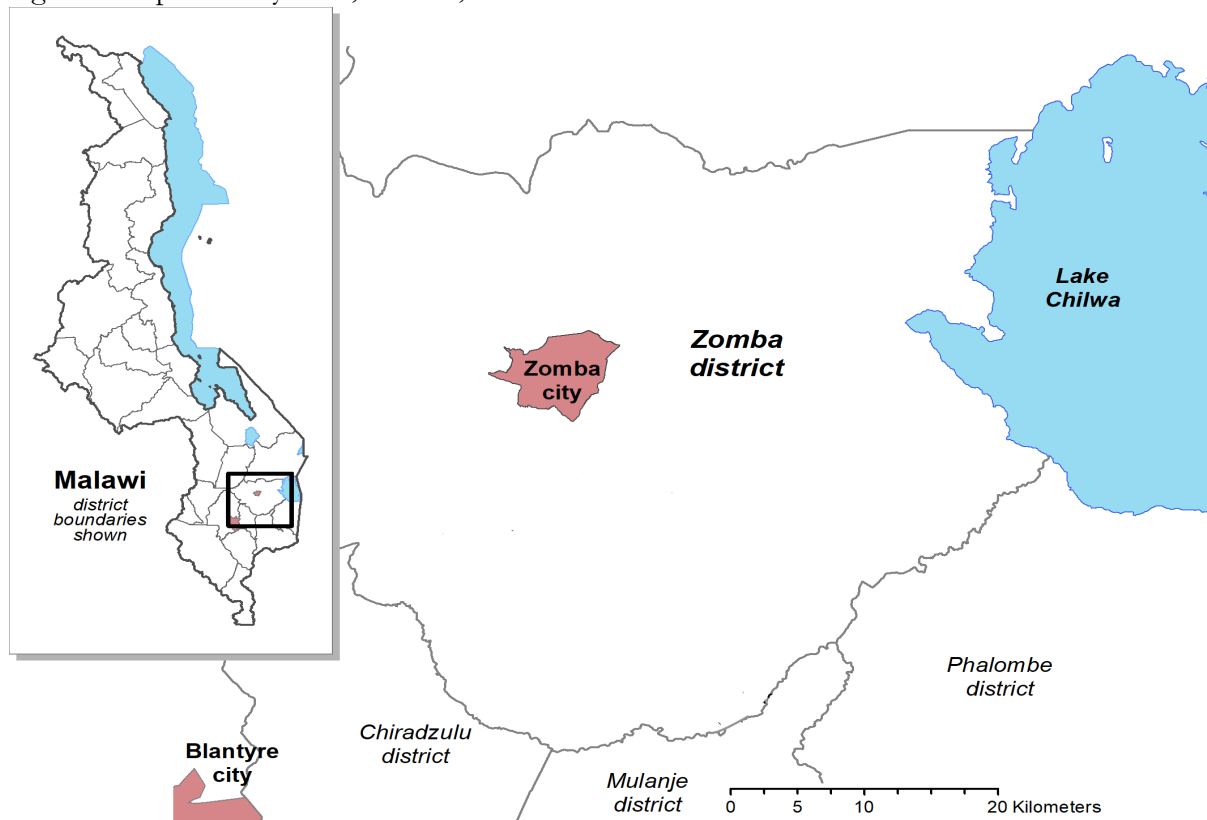
As a result, households were less able to purchase maize as market prices increased. In July 2016, maize prices ballooned 192% above the average of the past five years. Additionally, maize imports covered less than half the national cereal supply gap, leading to undersupply for national, commercial and humanitarian needs. The limited availability of maize and elevated market prices decreased household food security especially among the poorest populations⁵. During this period, UNICEF reported that more than 4,000 children were treated for severe acute malnutrition (SAM);

⁵ Famine Early Warning Systems Network (FEWSNET), Malawi: <http://www.fews.net/southern-africa/malawi>. Accessed September 12, 2016.

an 100% increase from 2015⁴. The World Food Program (WFP) initiated a 9-month humanitarian program (July 2016-March 2017) in response to the crisis with emergency school meals, food aid and cash distributions to 2.8 million recipients. Unfortunately, ration sizes were halved due to funding shortfalls (World Food Program, 2016).

Zomba struggles with similar challenges as other areas of the country, such as high poverty rates, but there are unique characteristics of the region that affect food security. Figure 4 below outlines the study area.

Figure 4. Map of Study Area, Zomba, Malawi



Source: Adapted from (Margolies et al., 2018)

In Zomba, the economy is primarily agricultural, with smallholder farmers composing 80% of the farming population. In contrast with the north of the country, land tenure is primarily matrilineal (94%), in that according to customary law, land is passed down through daughters rather than sons. Custom indicates that land ownership is transferred through the female lineage line

(*mbumba*) instead of through the male lineage. Uxorilocal settlement, where husbands move to the wife's village after marriage, is most common where the dominant ethnic groups are Chewa, Yao and Mang'anja. These practices contrast with the virilocal practices in the North. The uxorilocal matrilineal household typically includes a husband and wife pair, the wife's children and occasionally the wife's mother (Davison, 1993). Exceptions occur with ethnic intermarriage, if a bride price (*lobola*) is paid, or in the case of chieftaincy, as leaders reside in native villages to retain their power. However, men dominate production decisions, have more representation in agricultural clubs, and greater contact with extension workers (Djurfeldt et al., 2018). Traditional expectations of women encourage duty, obedience and the importance of fertility. Historically, colonialization challenged matriliney through the *thangata* indentured labor system. The system was established to pay British-imposed "hut taxes", leaving women to shoulder household agricultural labor (Davison, 1993). The Church promoted Christian patriarchal ideals of fealty, wifely obedience and subservience. Colonial law imposed male authority in marriage, allocated mission land to men, and promoted a cash economy that excluded women and reduced their status (Davison, 1993; Minton, 2008).

This informal system of lineage-based land tenure conflicts with the formal system of landholding, which has undergone reforms but was founded on patrilineal English legislation (Berge et al., 2014). The customary system permits women to hold and allocate land rights, but also raises questions about tenure security vis-à-vis the formal system as well as issues of control over those assets. In other words, property rights for women in matrilineal communities do not ensure greater women's empowerment. An analysis of the Living Standards Measurement Survey (LSMS) data in Malawi comparing matrilineal and patrilineal communities showed women often have less access to capital and other inputs for production, plant fewer high-value crops and make shorter-term investments, particularly if longer-term land tenure is not guaranteed (Bhaumik et al., 2013).

Further, analyses of the gender gap in agriculture have shown that even with access to equal

resources and inputs, female farmers have lower productivity than male farmers (Kassie et al., 2015). In Malawi, the cost of this gap is estimated to be approximately 100 million US dollars in lost GDP (United Nations Development Program, 2015). More specifically, in Malawi, although 52% of the agricultural labor force is made up of women, these female farmers exhibit characteristics that negatively affect productivity: farming smaller plots of land, possessing fewer years of schooling and the tendency to be a single-headed household (70% are widowed, divorced or separated)(United Nations Development Program, 2015). These characteristics raise the necessity of understanding why female-headed households are more vulnerable or less resilient than male-headed households. Female-headed households also have fewer social ties and face labor constraints⁶. Men typically control allocation of earned income because they perform the majority of labor outside the household. Food security in female-headed households is affected by many factors, including access to resources such as safety net programs, membership in rural institutions, access to social capital and credit, as well as the size of their kinship network (Kassie et al., 2015).

National nutrition policy and programs in Malawi

Malawi has made significant public commitments to improving nutrition through policy development and Government investment in nutrition interventions. Malawi has been a committed member of the SUN (Scaling Up Nutrition) Movement since 2011, in collaboration with the international donors USAID and Irish Aid (United States Agency for International Development, 2014). The SUN movement has supported the GoM to take specific actions to promote improved nutrition: establishing multi-stakeholder platforms for dialogue and collaboration; aligning policy and legal frameworks to the Sustainable Development Goals (SDGs); putting in place a results framework for monitoring progress on the national level; and creating a system (NURTS – Nutrition

⁶ Female-headed households compose 25% of Malawian households

Resource Tracking System) to track resources and funds used for nutrition programming for improved transparency (Sun Movement, 2016). Specific policies to address nutrition include the 1,000 Special Days National Nutrition Education and Communication Strategy (NECS) to reduce stunting in children in the first 1000 days, which was initiated in 2012 and concluded in 2017.

Despite the establishment of these national-level commitments and policies, hunger in many regions of Malawi are little improved over the past decades. Rather, worsening weather conditions linked to climate change have made crises more frequent, dire and protracted. Each year, agriculturalists in Zomba suffer from seasonal food insecurity prior to harvest. In 2015, severe rains and incidents of flooding created acute emergencies for communities in the region. Internal displacement of households due to flooding occurred in other parts of the Southern Shire Highlands, with many of those displacement sites located in Zomba⁷. In this setting, the urgency of humanitarian relief programs took primacy, directed by various government and NGO actors who provided emergency support to improve food security during recurrent crises. Otherwise, national programs to support longer-term development have traditionally been centered around productivity-enhancing programs. Formal social protection programs were developed to provide a safety net for households and to build household incomes through improved production and livelihoods. Several of the major Government-led social support programs to achieve these ends include: the Fertilizer Input Subsidy Program (FISP) and the Social Cash Transfer Program (SCTP), among others.

The Fertilizer Input Subsidy Program (FISP) was developed in the 1990s to increase smallholder production through the provision of coupons for discounted agricultural inputs. FISP expanded in the 2000's as the GoM's flagship program. Widely touted as the "Malawi miracle" (Denning et al., 2009), evaluations of FISP have shown mixed impacts (Chibwana, 2010; Chirwa et

⁷ Map of location of Displacement Sites – Zomba, Malawi (17 February 2015), ReliefWeb.
<http://reliefweb.int/map/malawi/malawi-floods-location-displacement-sites-zomba-17-feb-2015>.

al., 2011). In Zomba, soils are of poor quality and inorganic fertilizer is considered necessary for high productivity. However, poor and female-headed households have been found less likely to benefit from the program (Chibwana, 2010), and recipients often did not receive intended quantities (Holden & Lunduka, 2013). The Malawi Social Cash Transfer Program (*“Mtukula Pakhomo”*, also known as the SCTP) provided a \$13 cash transfer to ultra-poor households. Selection criteria included: food insecurity, lack of assets, undernourishment, and not receiving cash, food, or gifts from others. While these programs have provided support to poor agricultural households, a deficit remains which results in chronic food insecurity and malnutrition.

The Nutrition Embedding Evaluation Platform (NEEP) Program & Parent Study

The NEEP Intervention

This dissertation evaluates a nutrition-sensitive agriculture intervention called the NEEP program (referred to hereon as “NEEP”). NEEP was designed as a participatory program based on voluntary community support and was directed through early childhood development (ECD) centers. NEEP targeted children aged 3-5 years while also aiming to improve the livelihoods and food security of their families. NEEP activities were devised to improve livelihoods and consumption through increased household production and income, as well as to increase diet diversity through access to diverse foods and nutrition knowledge. The program was implemented by Save the Children in partnership with the Government of Malawi (GoM)’s efforts to improve ECD center quality.

NEEP was channeled through the national system of community-based childcare centers (CBCCs). CBCCs were established to engage and stimulate young children with the aid of volunteer teachers. CBCCs functioned as platform to conduct NEEP program activities, as well as a community focal point for improving child nutrition and development. The initial CBCC network

was created as part of the Ministry of Gender, Children and Social Welfare (MoGCSW)'s National Early Childhood Development (ECD) platform. NEEP agricultural activities were based on the United States Agency for International Development (USAID) "Wellness and Agriculture and Life Advancement" (WALA) program. These agricultural activities included promoting Village Savings and Loan (VSL) groups to facilitate access to credit for agricultural inputs, organization of farmer collectives, and production trainings. Nutrition activities included nutrition and hygiene education, promotion of child feeding behaviors, meal planning, preparation for school meals and gardens to improve meal quality. The NEEP program operated through existing CBCCs and was maintained with in-kind and voluntary contributions of households whose young children attended the centers.

ECD centers like CBCCs provide stimulating, safe environments for young children to promote cognitive and social development. ECD has long-lasting impacts on human development through increased investment in education, improved health, building of social capital and in addressing inequality (Van Der Gaag & Tan, 1997). ECD programs have been found to have short-term impacts on child intelligence and longer-term impacts on outcomes such as educational achievement and sociality (Barnett, 1995). ECD programs can also prevent developmental delays (Anderson et al., 2003). Nutrition interventions, however, have resulted in only small effects on child mental development; impacts that could be enhanced by program components incorporating stimulation (Larson & Yousafzai, 2015). To that end, ECD programs that incorporate nutrition could aid in the prevention of diminished cognitive and social capacities (Grantham-Mcgregor et al., 2007). Further, concurrent stunting is associated with cognitive ability in children entering school, suggesting that stunting reduction programs should include children up to at least five years old (Crookston & Et Al., 2011).

Unfortunately, the children most at-risk in early childhood live in poverty in low and middle-income countries where investment in ECD is low. Despite a preponderance of evidence on the

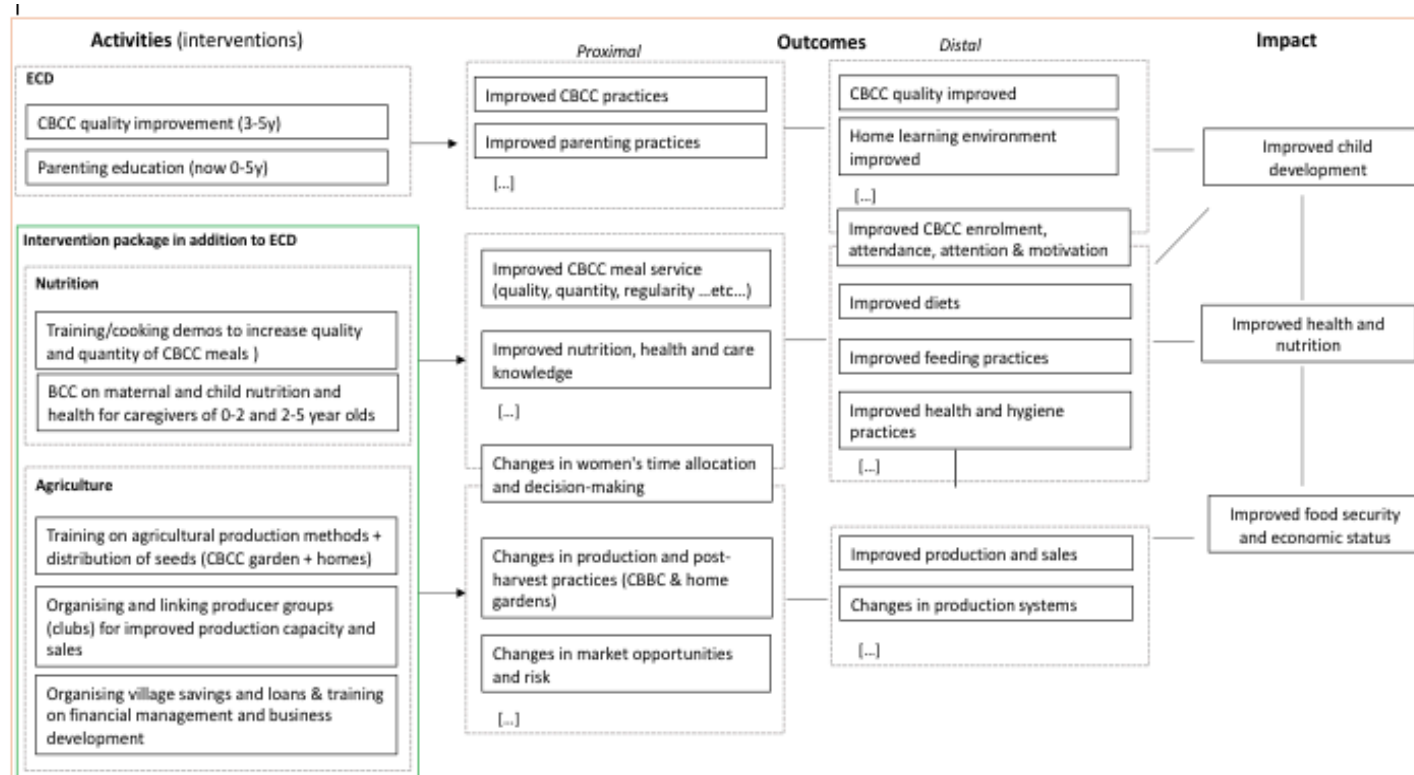
benefits of ECD, pre-primary enrollment for both sexes only reached 53.8% globally in 2013⁸. In Sub-Saharan Africa, this figure was much lower – 20% of children were enrolled in pre-primary programs⁹. Only 9% of countries in Sub-Saharan Africa offer free pre-primary education (Richter et al., 2016). Fortunately, external support for ECD programs is increasing. The World Bank has invested 3.3 billion in ECD over the past 13 years, and governments in developing countries are beginning to prioritize ECD (Sayre et al., 2015). Nevertheless, more political will and accountability is needed to scale up ECD programs (Richter et al., 2016).

ECD has recently gained support in Malawi, ultimately leading to the creation of the National ECD Curriculum Framework. However, ECD funding is limited relative to other policy areas and to total GDP. Despite limited investment, the number of ECD centers nationwide increased from 649 centers in 1996 to 8,917 centers by 2009 servicing 771,666 children (Chalamanda et al., 2010). Unfortunately, many CBCCs suffer from inadequate infrastructure and materials, as well as a lack of teachers and volunteers (Chalamanda et al., 2010). Studies confirm CBCC fragility and show that many centers are not operational due to reasons such as low caregiver motivation and weather conditions (Neuman et al., 2014). CBCCs play a critical role in the NEEP program. The program theory diagram in Figure 5 below (Gelli & Roschnik, 2014) was based on agriculture-nutrition evidence pathways to improved household diets, increased food security and child development. Program theory posited that household production of nutritious foods would be increased through improved agricultural practices for consumption and sale, and complemented by improved knowledge of nutrition through feeding practices at the household and CBCC levels.

⁸ World Bank/UNESCO: <http://data.worldbank.org/indicator/SE.PRE.ENRR?end=2013&start=1970>.

⁹ World Bank, ECD: <http://www.worldbank.org/en/topic/earlychildhooddevelopment/overview-1>.

Figure 5. Program Theory for the NEEP Intervention



Source: NEEP Technical Application (Gelli & Roschnik, 2014)

The NEEP study took place where CBCCs were supported by the Save the Children ECD program. This ensured a basic level of CBCC quality across treatment arms. The support was provided by the Conrad N. Hilton CBCC quality improvement program, which also included parenting trainings. NEEP included various components centered around CBCCs. Nutrition activities included meal preparation trainings for school meals, provision of behavior communication change (BCC) materials and child nutrition trainings for mothers. Agricultural components included in-kind provision of inputs for households and CBCC gardens, agricultural trainings, producer group support and access to Village Savings and Loans (VSL). NEEP also stimulated resource-sharing through community contributions and labor to community-based preschools to improve child development and nutrition outcomes.

Agricultural inputs were selected to increase crop diversity and production and to facilitate access to culturally acceptable, nutritious foods. These seeds included local varieties such as the orange maize *Mthikinya* that is high in Vitamin A and carotenoids (Hwang et al., 2016), pigeon peas, cowpeas, beans, groundnuts, soya, orange-fleshed sweet potato (OFSP), carrot and amaranth. Nutrition trainings included content on meal preparation, recipes, food processing and preservation. In most cases, traditional recipes were used to incorporate nutritious ingredients such as porridges made with groundnut, fish powder or mango, soy milk, pigeon pea sausage, pumpkin leaf meatballs, and sweet potato juice. CBCC gardens were test plots for new crops and techniques (Gelli & Roschnik, 2014).

Figure 6. Timeline of NEEP Program Activities (2015-2016)

NEEP Activities	2015		2016										
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
<u>Training and Capacity-building</u>													
<u>Agriculture Training</u>													
Agricultural production training of trainers (TOT)													
Ag training (community)													
Agricultural production training 2													
<u>Livestock training</u>													
Livestock training													
<u>Nutrition Training</u>													
Nutrition and food processing TOT													
Nutrition and food processing training (community)													
<u>VSL Training</u>													
Village Savings and Loans TOT													
Village Savings and Loans trainings (community)													
<u>Parenting Training (Both treatment & control)</u>													
Parenting TOT													
Parenting trainings (community)													
<u>In-kind Distributions (Household & CBCC level)</u>													
<u>Seeds</u>													
Orange maize													
Peas and beans (cowpeas, pigeon, kidney, soy)													
Groundnut													
Amaranthus and carrot													
Orange-fleshed sweet potato													
Fruit trees, mango & papaya (CBCC only)													
<u>Livestock</u>													
Black Astralop chicks													
<u>VSL Materials</u>													
Cash boxes, pass books, hardcovers, pads, ink													

Source: Compiled by the author from NEEP program materials.

The Parent Study: NEEP-IE

This research was nested within a larger parent study. The NEEP impact evaluation, or NEEP-IE, was conducted by the International Food Policy Research Institute (IFPRI) from 2015-2017. NEEP-IE was funded by the Nutrition Embedding Evaluation Program (NEEP) from PATH/DFID to conduct a randomized control trial (RCT). NEEP-IE occurred in collaboration with Chancellor College and Save the Children, Malawi. The Principal Investigator (PI) was Dr. Aulo Gelli. Funding for qualitative data collection was provided by Innovative Methods and Metrics for Agriculture and Nutrition Actions (IMMANA) at the London School of Tropical Hygiene and Medicine (LSTHM)¹⁰, and for the dissertation research by a Health Systems Doctoral award. The aims of NEEP-IE were: 1) To evaluate the program's impact on diets, nutrition and development of children aged 36 to 72 months; 2) To evaluate impacts on CBCC meal provision, attendance and enrolment; 3) To identify principal factors that affect impacts on child and household outcomes; 4) To evaluate the effectiveness of ECD centers and parenting groups as vehicles to improve nutrition related outcomes to children and younger siblings, 5) To evaluate the cost, feasibility and sustainability of scale-up (Gelli & Roschnik, 2014). Figure 7 details these indicators.

Figure 7. Main Outcome Indicators for the NEEP Program

Type	Domain	Indicators
Primary	Diets	Individual intake and diet diversity score (children 36-72m).
Primary	Childcare practices	WHO IYCF practices.
Primary	CBCC participation	CBCC enrolment and attendance (children 36-72m).
Primary	Agriculture	Production output, crop-mix.
Secondary	Health & nutrition status	Anthropometry (Weight-for-age, height-for-age, weight-for-age z-scores and MUAC) (children 6-72m).
Secondary	Child development	Malawi Development Assessment Tool z-scores (fine motor, gross motor, language and social domains) (children 36-72m).
Secondary	Gender	Women's asset ownership, time use and productivity.
Process	Meal service	Quality of CBCC meals, portion sizes, frequency.

¹⁰ Awardees, Grants Window Round 1, IMMANA. IFPRI, *Leveraging value chains to improve nutrition: collaborative learning initiative on methods and metrics for improving the identification, design and evaluation of interventions* (<http://immana.lcirah.ac.uk/node/365>).

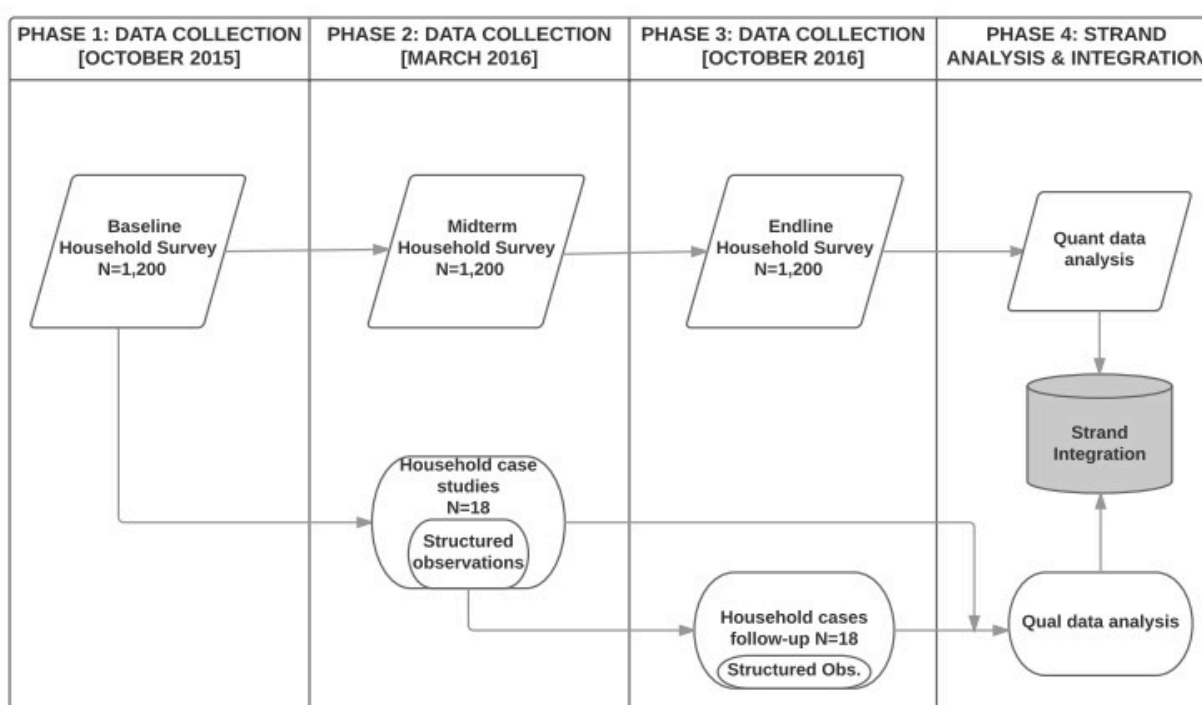
The doctoral researcher was engaged in NEEP-IE as a Co-Investigator from 2015-2017. The researcher was supervised by the PI Dr. Gelli, and worked in collaboration with Dr. Noora-Lisa Aberman, Program Coordinator of IFPRI-Malawi, and Dr. Bob Baulch, Head of IFPRI-Malawi. Additional researcher qualifications are detailed in the Curriculum Vitae.

Overview of Methods

This dissertation took a mixed-methods approach with a multiphase design (Figure 8). Mixed-methods research incorporates both philosophical assumptions of quantitative and qualitative research, *“Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone”* (Creswell & Clark, 2011). This design is advantageous as it allows for qualitative data collection to explain phenomena and trends in the quantitative data while drawing on the strengths of both methods. One of the three research papers used mixed-methods, and the dissertation as a whole also took a mixed-methods approach and thus integrated lessons from all three papers. In the multiphase design, five phases were conducted over one year from pre-implementation (baseline) to post-intervention (end line). The phases included three data collection periods, beginning with a baseline quantitative household survey, followed by a midpoint with concurrent quantitative and qualitative data collection, followed by a quantitative survey one-year post and follow-up qualitative data collection. Thus, the paired quantitative-qualitative data collection sequence was repeated in two cycles, at midline and end line. The mixed-methods synthesis was conducted in Phase 5. The rationale for this design was to bring out greater explanatory depth of quantitative trends through in-depth qualitative research along specific lines of inquiry. While there was some feedback between data strands (quantitative and qualitative), strand phases were not sequential. In other words, strands were parallel during data collection but it was only during analysis that data integration occurred. However, emergent themes from earlier phases of data collection were used to fine tune and to adapt instruments. For example, in the first round of

qualitative data collection, thematic trends on sharing and reciprocity in resource distribution emerged. The team adjusted qualitative IDI guides to further probe on these questions as well as including interviews with village chiefs. The multiphase design was appropriate to track outcomes over time, as well as to capture effects of seasonality. Although this study was grounded conceptually on agriculture-nutrition linkages which espoused a primarily etic approach, the use of qualitative interviews incorporated an emic perspective¹¹.

Figure 8. Multi-phase Design



Ethical approval

IRB approval was obtained through the International Food Policy Research Institute (IFPRI) and Chancellor College, Malawi. All participation in this study was voluntary. Informed consent for quantitative data collection was obtained and written or verbal consent was acquired for

¹¹ Terminology widely used in the social sciences literature. Emic: from the perspective of the subject or within the social group; Etic: from the perspective of the observer or outside the social group. [Pike, KL (1967). Language in relation to a unified theory of the structure of human behavior (2nd Ed.): 37-72. The Hague, Netherlands: Mouton & Co.]

all qualitative interviews. The use of Android tablets for quantitative data collection allowed for automatic uploads from the field onto an external, password-protected online SurveyCTO server. Only NEEP enumerators and team members possessed access to the server while data collection occurred and the server was then deactivated. Transcriptions were de-identified and data was stored in a password-protected Dropbox archive.

Literature Review

In this section, an overview of literature relevant to each research aim is presented in order of their presentation in the dissertation document: first, Research Aim 1, second, Research Aim 2, and third, Research Aim 3.

Agriculture-Nutrition Programs and Household Food Security

Integrated agriculture-nutrition programs, also known as “nutrition-sensitive” agricultural programs, leverage nutrition gains by improving household agricultural production while also supporting nutrition education and improved diets. Nutrition-sensitive programs are recognized as having potential to address malnutrition and to increase the effectiveness of nutrition-specific interventions. However, there is insufficient evidence on the effectiveness of nutrition-sensitive agriculture programs due to poor program implementation and limited evaluation quality (Ruel et al., 2013). The evidence gap begs further study of these programs. Nutrition-sensitive agriculture programs can be distinguished from traditional agricultural programs which do not directly target nutrition. For example, for years donors and the Ministry of Agriculture in Malawi focused on improved production of cash crops, primarily maize, as a remedy for rural poverty and a driver of economic growth. These programs often discouraged techniques such as intercropping and the use of local seeds, both of which ultimately improve household diet quality (Ferguson et al., 1990).

The diet of Malawian households, particularly in rural areas, is primarily maize-based. This diet incorporates limited amounts of fruits and vegetables and rarely includes animal-source protein.

The staple food is *nsima*, or yellow corn patties made of milled flour, which have low levels of iron and zinc. The lack of diversity in the Malawian diet results in inadequate micronutrient intakes of Vitamin A, iron and zinc, among others (Dickenson et al., 2009). Nutrition-sensitive programs take a comprehensive approach to improving the nutrition of individuals and households by addressing constraints on household diets, knowledge and practices.

There is an increasing number of studies that show positive impacts of nutrition-sensitive agricultural programs. These programs typically fall into three categories: those focused on 1) enhancement (fortification), 2) diversification (planting diverse crops), and 3) substitution (livelihood activities). Notably, most evidence originates from interventions that promote enhancement and diversification, often through Vitamin A-enriched food production, whether through designs using home gardens (Fiorella et al., 2016) or through women's community health services (Webb Girard et al., 2015). Other programs have also included poultry and nutrition education with home gardens. In one study, this approach was found to affect child growth, but did lower anemia for children 12-48 months, and was also found to lower anemia and improve mothers' underweight (Osei et al., 2016).

In the NEEP intervention, CBCCs were used as platform to engage households in program activities. These activities were designed to influence the household and individual level factors that determine food access and consumption (Pingali, 2015). In terms of household food access, this approach emphasized increased household income (which affects the household's ability to purchase food) and micronutrient and food availability (production of diverse foods). At the individual level, this included the allocation of food (if all individuals in the household are able to access sufficient and nutritious food) and nutrient absorption and utilization. Thus, individual nutrition was seen as a product of individual factors such as health status, and household-level determinants including diversity of household production and access to social programs. To this end, a recent review of agriculture-nutrition program evaluations drew the conclusion that the focus on nutritional

outcomes should be shifted to diet and food access instead: “*For reasons of both program scope and statistical power in the majority of evaluations, the more appropriate outcomes to expect from agriculture-nutrition projects are improved food access and dietary consumption*” (Herforth & Ballard, 2016).

It is important to keep in mind, however, that the determinants of food security and nutrition are mediated by other factors such as gender norms or access to credit. These factors can affect both household and individual levels and must be taken into consideration in program design. Gender, for example, is relevant to household food security in affecting access to resources through norms, power and decision-making. Further, gender can affect access to arable land; an important component to food security. In this case, while matrilineal land tenure is common in Zomba, women’s control over agricultural land is not guaranteed.

Further, although in this context women commonly participate in farm labor, agricultural activities are also defined by gender norms. For example, *dambo* (wetland) cultivation or household gardens are mostly tended to by women. *Dambos* are composed of vegetable and staple crops rather than higher-value cash crops. These gendered divisions of labor limit women from accessing or controlling income from selling cash crops such as tobacco or cotton. Moreover, engagement in market activities are often gendered - women may be expected to only sell certain foods (prepared foods, vegetables) and may be vulnerable to harassment or vendor price gouging (Margolies & Aberman, 2018). Additionally, female-headed households suffer higher food insecurity if excluded from social or kin networks that distribute in-kind resources such as food and labor. Finally, decision-making around the intra-household distribution of resources, particularly food, is a gendered dynamic that affects utilization. For example, in the Malawian context, men have greater control over decisions made on crops with higher exchange value (Aberman & Roopnaraine, 2018).

There are several conceptual models of agriculture-nutrition pathways and not all will be discussed here. These models include macro-level confounding factors such as environmental

shocks or the availability of public health services, as well as individual-level factors such as food preferences or culture. Figure 9 depicts a model of the key pathways from agriculture to nutrition that provides a useful backdrop for understanding how nutrition-sensitive agriculture programs are designed to work (Gillespie, 2012). This particular model is helpful as it outlines the pathways examined by the research aims of this dissertation. Improvements in household assets and livelihoods affect food income through consumption and markets, but non-food income and employment are also pathways through which expenditure increases. This increased expenditure improves health through increased energy and nutrient consumption, healthcare expenditure or improved care capacity, resulting in improved nutrition outcomes. Additionally, this figure depicts relationships not included in other models, such as the relationship between women's time and care capacity, which will be explored in Chapter 5. In many cases, women's time is counted only in formal employment, failing to adequately capture the often-informal nature of women's work outside the labor force, which demands significant investments of time and energy.

Figure 9. Seven Pathways through Agriculture to Nutrition

- ❑ **Pathway 1: Own production → food consumption**
- ❑ **Pathway 2: Income → food purchase**
- ❑ **Pathway 3: Income → healthcare purchase**
- ❑ **Pathway 4: Food prices → food purchase**
- ❑ **Pathway 5: Women's time use → care capacity**
- ❑ **Pathway 6: Women's workload → maternal energy use**
- ❑ **Pathway 7: Women's control of income → resource allocation**

These pathways are helpful to map the links from agriculture to nutrition to understand how programs can impact nutrition and food security at the household and individual levels. However, they do not depict the cyclical and mutually reinforcing nature of these relationships. The complex nature of these linkages suggests a potential benefit of multiple methods of assessment for nutrition-

sensitive agricultural programs. Although the current state of program evaluation is heavily focused on quantitative measurement, acknowledgement of the nonlinearity of change and the importance of program processes and social factors in influencing outcomes stresses a need for qualitative and mixed-methods research (Devereux et al., 2013).

The Moral Economy, Kinship, and Resource Allocation

The concept of a moral economy centers on the theory that collective actions and reasoning are taken as a product of both social and economic pressures, and aids in the comprehension of how or why distribution of productive assets occur (Thompson, 1971). Pressures elicited from culturally specific mores have been used to explain and analyze collective mobilization around high food prices and food scarcity (Wolford & Nehring, 2013). A moral economy is based in traditional solidarity networks that function through reciprocity and the obligations entailed in those exchanges. These networks are arranged around kinship or extended family networks, but may also include friends, neighbors or relational contacts through religious or community groups. These networks offer protection against risk in small, traditional communities such as Malawian villages and are typically oriented around informal resource transfers (Devereux & Getu, 2013b). Support from kin are key entitlements for food security in Malawi (Bezner Kerr, 2005a). Studies in other countries in Sub-Saharan Africa emphasize the importance of non-market transfers, such as support received in the form of gifts or as social exchange to food security (Adams, 1993) or between friends (Longhurst, 1986). These non-market transfers are given and received through the maintenance of social networks which aid in mitigating risks from seasonal shocks, particularly in agricultural communities. However, the influence of modernization on agrarian communities has also facilitated the growth of impersonal contractual relationships and diminished reliance on elite paternalism (Scott, 1977), which has tested these informal traditional networks.

Although smallholder agricultural villages in Malawi suffer from chronic seasonality and resulting pressures of food insecurity, communities also receive external resources from a variety of sources. These external resources originate from both the local and national Governments as well as from local and international non-governmental organizations, and are provided primarily in response to crises. There is great interest in the international humanitarian community to “break the cycle” of chronic food insecurity. In turn, there is increased pressure on the Government to address cyclical food shortages. Nonetheless, interventions and response efforts are often piecemeal and ineffective in the long-term in addressing food insecurity. Further, much research on the topic focuses on assets and underemphasizes other dynamics that affect household food security, such as sociocultural norms (Hoddinott, 2014). Inasmuch, *“another reason why the focus on incomes is incomplete is that it fails to consider non-market entitlements – which includes not just aid and welfare transfers, but also the complex social relationships that exist between rural households (the ‘moral economy’ and extended family networks, patron-client bonds, reciprocity and sharing arrangements)”* (Devereux, 1993).

Formal social protection (FSP) programs, directed by actors external to local communities, play an important role in resource distribution where resources are limited and households struggle with land scarcity. These programs operate without explicit linkages to more customary, traditional systems of informal social protection (ISP). Formal programs are designed and delivered by non-community-based organizations such as international NGOs and Government. External programs can increase the adaptive capacity of communities, but it is not clear whether or not they reinforce local resource distribution systems or act in complementary ways to provide support. With a decline in social cohesion and exchange systems due to increased poverty, land scarcity and climate shocks, it has been theorized that FSP might “crowd out” ISP (Devereux & Getu, 2013a). FSP could also be channeled into existing ISP or patronage networks. The relationship between these formal and informal mechanisms is often overlooked in program design and delivery.

On the other hand, although the moral economy sustains systems of community support, and the survival and maintenance of local-level governance structures, reliance on kinship structures for resource allocation can result in inequitable distribution of resources. This raises the question of why programs may not reach beneficiaries as effectively as intended. Social safety net programs and humanitarian interventions are often targeted to most the vulnerable households rather than to entire communities. One issue that has plagued these programs is efficient targeting to the poor. For example, while decentralized targeting was touted in the FISP, it has been found that it often failed reach the poorest. Instead, wealthier, well-connected households had a higher probability of inclusion and received more inputs than poorer households (Kilic et al., 2015). Aid redistribution by local brokers has been widely documented and is rooted in clientelism and attempts to operate around or independently of the State (Sardan, 1999). At the village level, the myriad pressures of gift-giving and social obligations from kin add to this dynamic, as do local rivalries and desires for reputation-building (Sardan, 1999). Community-based targeting of vulnerable households may also fall prey to moral economy effects - in that they may be diverted through kin circles or redistributed through gift, obligation or solidarity networks.

There are diverse, interconnected networks that distribute and redistribute these resources. At play are traditional and increasingly modernized support systems that operate at the village level; including traditional solidarity networks of generalized reciprocity (gifts, dowries), traditional self-help of balanced reciprocity (savings clubs) and modern self-help groups (cooperatives) (Hebo, 2013). Different groups and social protection arrangements (informal arrangements such as family support; semi-formal arrangements such as self-help groups; and formal arrangements such as government assistance programs) represent a continuum of how far reciprocal networks extend. However, under situations of duress, such as severe food insecurity or famine, reciprocity networks may shrink to immediate family due to necessity and limited assets (Longhurst, 1986). Local

networks are a pool of social capital that can be drawn upon in times of vulnerability or shocks, depending on the influence and access of the household or individual to those networks. These are the filters through which external resources enter communities.

This being said, certain household types or individuals less connected to networks, such as *obweras* (non-native residents of the village) or female-headed households, may be excluded from kinship circles or from access to the redistributive power of local governance (Muiriri, 2013). Exclusion from social networks and knowledge of resource distribution processes has been found to impede female farmers in their adaptive capacities in terms of the use of agricultural strategies to combat climate change (Smucker & Wangui, 2016). Women often possess fewer assets and receive less resources from kin than men, and as divorce is common in Southern Malawian matrilineal communities there is usually less support for female-headed households or widows from family (Bezner Kerr, 2005a). Another notable example of the role of gender in food security occurred during the 1949 Malawi famine. Men had greater access to resources from external sources while matrilineal support diminished due to scarcity (Vaughan, 1987).

Informal mutual assistance networks operate through reciprocal transfers, primarily through descent proximity but also through physical proximity. Thus resources, whether in the form of labor, capital or as an in-kind transfer such as food, are shared, exchanged and borrowed. These exchanges can be referred to as “generalized reciprocity,” as they do not occur through negotiated processes nor possess a specific timeframe for payback (Hebo, 2013). These sociocultural elements could prove to be a facilitating factor for programs or, conversely, could create obstacles to improved outcomes. Understanding the dynamics of these social factors and reciprocity systems aids in mapping the resources for food security and nutrition and, in turn, how to better inform program design to improve these outcomes.

Time use and Gender

Agrarian households in Malawi depend on subsistence agriculture for basic survival and for income. Agricultural labor and productivity play a central role in the economic activities of the household and the national economy. The labor demands of agriculture on rural households are significant. Each individual in a household has a finite amount of time to allocate to a variety of traditionally “productive” labor activities such as agricultural work, and “non-productive” activities such as leisure. Thus, analysis of how agricultural households allocate time is essential to understanding the potential tradeoffs between routine household activities and those of development programs.

Time use studies are not new to the literature. However, the body of evidence is built on time accounts from developed countries. Time use studies have typically been used to examine household behaviors and to conduct economic and social accounting (Stafford, 2011). However, the activities that make up the unpaid household economy, such as childcare, are often excluded from national accounts of labor productivity. Also known as the “care economy”, this concept covers both paid and unpaid care work that includes reciprocal caregiving such as childcare for neighbors or relatives. In recent decades, more attention has been paid to this oft-unseen aspect of unpaid labor, the bulk of which falls most heavily on women. Therefore, the extra burden, or “double workday” that women face – shouldering daily chores and childcare responsibilities while also contributing to household agricultural activities such as the planting, weeding or the sale of crops – is generally underestimated (Blackden & Wodon, 2006). While the lack of attention to unpaid labor is persistent, its importance was originally identified in a classic theory of time allocation as the incorporation of the cost of time as a market good (Becker, 1965). It follows that time poverty refers to how various competing pulls on an individual’s time limits their capacity to make choices on how

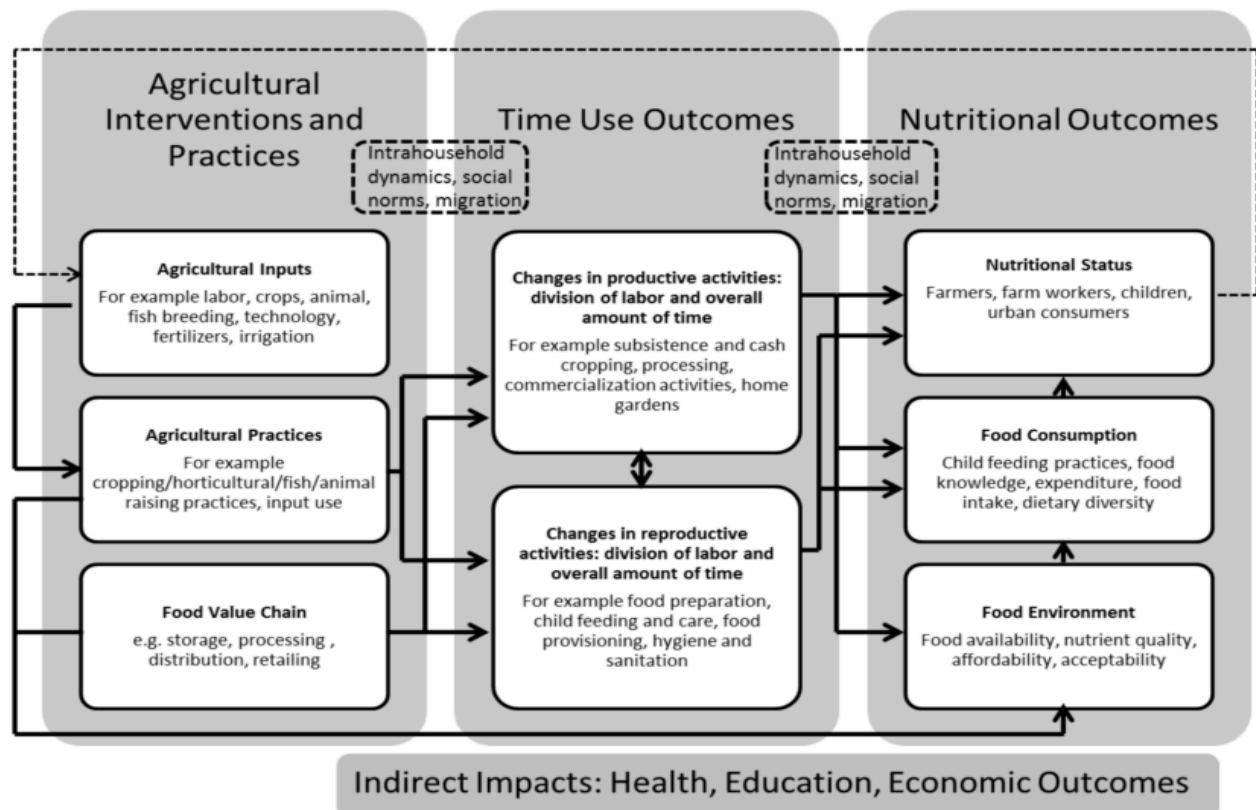
to use their time. Time poverty is most problematic in poor households with limited resources, leading to negative tradeoffs in food security and nutrition (Blackden & Wodon, 2006).

Time poverty is more likely to be experienced by women than by men (Bardasi & Wodon, 2010). Other factors that affect time poverty include rurality, age (Leslie, 1989), time allocation of other household members, and the presence of adults other than the spouse in the household (Weerahewa & Lanka, 2015). Recent research on time use has identified clear gender differences in time allocation across contexts. Data from 27 countries has shown that as a country's GDP decreases, gender disparities in total work increase (Burda et al., 2013). Studies in other settings confirm these findings on women's higher work burdens in developing countries. For example, in Bolivia, women invested more time in labor than men, and had a higher work intensity due to multi-tasking and decreased leisure (Ringhofer, 2015). In another study, women in Mozambique were more time-poor than men, also exhibiting greater multi-tasking and work intensity (Arora, 2015). Moreover, female-headed households suffer a triple disadvantage of economic vulnerability, gender discrimination and an absence of familial support (Buvinic & Gupta, 1997). One example of this phenomenon was how food price hikes in Uganda were more detrimental to divorced and widowed women's time than to married women (Campus & Giannelli, 2016).

Time allocation also varies by agricultural season, cultural context and gender. In Pakistan, in seasons of low farm labor, time invested in farming was found to be delineated by gender, but this dynamic shifted during the rainy season when farm labor was contributed by all (Fafchamps & Quisumbing, 1999). Likewise, significant seasonal changes in activity patterns were seen in Ghana. In the dry season, less farming occurred and women were primarily making crafts, going to market and preparing food while men migrated to seek temporary work (Tripp, 1982). Opportunity costs of activities were also affected by seasonality, particularly during the peak agricultural season when households were overburdened (Leslie, 1989).

A female caregiver's time use can affect her ability to care for children or may impact other elements of the household food environment, such as food consumption. Child nutrition can be negatively affected by increased female agricultural work burdens (Kadiyala et al., 2014). Female labor force participation has been found to lead to lower nutritional status for preschool children (Popkin, 1980). Time poverty can negatively affect food security and child nutrition as households struggle to balance subsistence activities and care work (Blackden & Wodon, 2006). Time poverty affects women's care capacity in that the opportunity cost of one activity affects her ability to conduct others. Moreover, malnutrition is most detrimental during the first 1,000 days of a child's life, a period when women are already heavily burdened (Blackden & Wodon, 2006). Figure 10 shows a theory of change for the impact of agriculture on nutrition via time use (Johnston & Kadiyala, 2015). This theory of change feeds into the conceptual framework for this research, and provides a foundation for the study in Chapter 5 on women's time use and program participation.

Figure 10. Theory of Change for Impact of Agriculture on Nutrition via Time Use



A conceptual framework provides a theoretical basis upon which to structure research, however, questions on the measurement of women's time use, care capacity and nutrition remains. A useful tool to understanding the links between gender and agriculture is the result of a collaboration between IFPRI and the Oxford Poverty and Human Development Initiative (OPHI). The Women's Empowerment in Agriculture Index (WEAI) is a means to measure relationships between agriculture and women's empowerment (Alkire et al., 2013). The WEAI is a composite indicator covering five domains: decisions about agricultural production, access to and decision-making power over productive resources, control over use of income, leadership in the community and time use. The WEAI is a helpful measure as it acknowledges that women's care capacities are affected by their time burdens, which can negatively affect child nutrition.

Related to this question is how agricultural programs affect intra-household time allocation. There is a significant body of literature on the effects of agricultural programs on households, but many studies focus on the time-saving impacts of agricultural modernization and technologies. In fact, unexpected disparities in time use can occur if these programs are not gender-sensitive. Further, agricultural extension services are not tailored to women's schedules or agricultural tasks (Blackden & Wodon, 2006). Similarly, programs promoting health practices can create additional time burdens for women; in other words, participatory approaches to improved health and nutrition can have both costs and benefits (Leslie, 1989).

Voluntary or community work falls under the domain of unpaid work often shouldered by women, and is similarly underestimated and ignored (Elson, 2002). Voluntary community work, whether in the form of self-help groups, religious group participation, or caring for children outside the household adds to the burden of unpaid female labor. It is therefore of interest whether participatory programs could be an additional burden on women, particularly in terms of their care capacity. In studies that focus on intra-household time allocation, few incorporate domestic work or

other types of non-market activities, despite the importance of these activities for household welfare. Further, although studies show that time allocation differs by household member, it is not clear how demographic differences such as gender and age affect time allocation (Canavire-Bacarreza & Ospina, 2015). Programs requiring or encouraging participation, whether intentionally or unintentionally, may increase the time burdens of participants through program-related tasks.

The NEEP program has a participatory design, in that key components rely on household and individual time contributions. These contributions include school meal preparation, engagement in agricultural activities and nutrition trainings, and CBCC committee membership. In rural Malawi, female caregivers already have significant burdens of care in addition to agricultural responsibilities.

Time use studies can aid in understanding the meaning of time changes for women and men, and whether changes lead to expansions of agency or choice (Walker et al., 2013). Without detailed, nationally representative and comparable data on women and girls, potential negative impacts on these populations from development programs may be underestimated (Buvinic & Levine, 2015). Recently collected data from five countries showed that decreases in caregiving affected child nutrition if households are poor, while wealthier households were supported by assets that increased the positive effects of unpaid work; *“From this evidence it is clear that agricultural development interventions need to be particularly careful not to encroach on the time of women in poor households, especially because these women already face greater time constraints than women in nonpoor households”* (Komatsu et al., 2015). Gender experts have also encouraged the measurement of time use in project evaluations to avoid overburdening or exacerbating existing gender disparities as well as to improve impacts (Blackden & Wodon, 2006). Others have called for rigorous studies examining links between agriculture, nutrition and women’s time use, including how programs may affect women’s time differently depending on poverty level and context (Kadiyala et al., 2014).

In Chapter 5, an adapted WEAI module was incorporated into the household survey to measure program-related changes in women's time use. Recent scholarship on gender-sensitive agricultural research also emphasizes the importance of using mixed-methods techniques from the fields of anthropology and economics to effectively trace patterns of time use as well as to explain social dynamics and context (Behrman et al., 2014). Thus, the research in Chapter 5 incorporates both the quantitative measures of the adapted WEAI time allocation module as well as qualitative explorations of women's perceptions and experiences with the program as related to time use.

Summary

In this chapter, the following sections were presented: conceptual framework, research setting, intervention description, parent study, overview of dissertation methods and literature reviews for Chapters 3-5. The next chapter, Chapter 3, contains the first of three stand-alone research papers. This first paper uses quantitative methods to measure the impacts of the NEEP program on household food security and coping strategies.

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CHAPTER 3: Food security impacts of a community preschool-based nutrition-sensitive agriculture program in Southern Malawi

Abstract

Background: This study assessed a nutrition-sensitive agricultural intervention, the Nutrition Embedding Evaluation Program (NEEP), which was delivered through community childcare centers in Southern Malawi. Nutrition-sensitive agricultural programs show potential to improve the food and nutrition security of poor smallholder households. These programs promote both nutrition activities such as knowledge-building and behavior change communication as well as the production and consumption of nutritious foods. **Methods:** A longitudinal panel of household surveys was used to test differences in impact between households in the treatment (n=600) and control (n=600) groups using a difference-in-difference estimator. Impacts were measured on indicators of household food security and coping strategies over three periods. **Results:** No treatment effects of the program were found on two primary measures of household food security, the Household Food Insecurity Access Scale (HFIAS) and the Household Diet Diversity Score (HDDS) at the $p < 0.025$ level. Subgroup analyses of female-headed households did not show differential treatment effects by treatment group on the HDDS and HFIAS. A secondary analysis measured program effects on the severity of household coping strategies. The NEEP program significantly decreased the severity of household coping strategies in the treatment group during the lean season: $-0.08(1.29)$, relative to the control: $0.06(1.49)$; a difference of $-0.29(-0.44, -0.13)$, $p < 0.001$. There were no significant differences in impact between the treatment groups at end line. Subgroup analyses showed the program had no differential treatment effects on the severity of coping strategies between female-headed households in the treatment group as compared to the control group. **Conclusion:** The NEEP program showed potential to provide protective effects against severe household coping strategies during the lean season, but significant impacts on diet diversity and food access were not found after adjustment for multiple comparisons.

Introduction

Malawi's economy is largely dependent on agriculture, with the majority of the population surviving as rural smallholder farmers that cultivate on less than two acres of land (Republic of Malawi, 2012). Malawi relies on subsistence and rainfed agriculture, which leaves the country vulnerable to the variable effects of climate change. Notably, Southern Africa has experienced a significant reduction in growing season length between 2004 and 2017. The 2015-2016 El Niño delivered its worst effects on agricultural production in Malawi and on its neighboring countries (Food and Agriculture Organization, 2018). While recent Government estimates suggest national poverty rates have dropped, the effects of floods in 2015-16 and increasing inequality in rural areas tell a different story. Most agrarian households in rural Malawi are trapped in cycles of hunger and poverty (Dabalen et al., 2017). More children in rural areas are underweight (33%) than in urban areas (23%)(Republic of Malawi, 2012). The poor state of child nutrition in Malawi can be attributed to household food insecurity, among other causes. Food security in Malawi declined from 2010 to 2017, and during this period the percentage of households experiencing very low food security nearly doubled to 61% (International Food Policy Research Institute, 2018). Food insecurity in Malawi also varies by region. In Southern Malawi, children 6-59 months are 13 times more likely to be severely underweight as compared to children in the North (Republic of Malawi, 2012).

The Ministry of Agriculture, along with key stakeholders and donors, has promoted the production of cash crops - primarily maize - to address problems of food security and malnutrition. Cash crop production is seen as a remedy for rural poverty and a driver of economic growth. However, yield-focused programs that emphasize maize mono-cropping do not comprehensively address child malnutrition. These programs discourage intercropping, use of indigenous germplasm and crop diversity, resulting in negative effects on household diet quality (Ferguson et al., 1990). Low-nutrient maize, which is traditionally consumed as the primary staple food *nsima*, or maize meal,

contains low concentrations of iron and zinc. The maize-dependent diet of Malawian households is mostly devoid of animal-source protein and provides insufficient amounts of fruits and vegetables. This diet results in inadequate intake of micronutrients such as iron, zinc and Vitamin A (Dickenson et al., 2009).

Government and development organizations seek sustainable solutions to Malawi's food and nutrition problems. Nutrition-specific interventions such as supplementation and treatment for acute malnutrition have played an important role in addressing critical nutrition deficiencies after they occur. However, nutrition-specific programs do not address the underlying causes of food and nutrition insecurity. Nutrition-sensitive interventions aim to address the conditions that lead to these nutritional deficits. These programs have shown promise in addressing the nutritional challenges of subsistence households by focusing on actions to improve nutrition through agricultural channels. Nutrition-sensitive programs leverage nutrition gains with activities such as nutrition education and technical agricultural support to improve household production and the consumption of diverse foods. These programs show potential to address the causes of malnutrition as well as to increase the effectiveness of nutrition-specific interventions. However, evidence on the effectiveness of nutrition-sensitive programs is lacking due to poor implementation and limited evaluation rigor (Ruel et al., 2013). That said, there is a growing body of research on community-based models for agriculture-nutrition programs. These programs usually take one of the following approaches: enhancement (fortification), diversification (planting diverse crops), and substitution (new livelihood activities). Notably, a review of the evidence on the outcomes of these programs showed improvements mainly based on enhancement and diversification, primarily through Vitamin A-enriched food production, home gardens and small animal production (Fiorella et al., 2016).

This paper measures the food security impacts of a nutrition-sensitive agricultural program. The Nutrition Embedding Evaluation Program (NEEP) was implemented by Save the Children in

Zomba District, Southern Malawi. The NEEP intervention was delivered through community-based childcare centers (CBCCs) over the course of one year.

The NEEP Intervention

The NEEP intervention was designed to capitalize on the linkages between agriculture and nutrition by promoting diversified household production and the consumption of nutritious foods. The program targeted preschool children aged 3-5 years by channeling activities through local childcare centers (CBCCs). CBCCs are community-supported spaces promoting early childhood development with stimulation by volunteer caregivers to better prepare children for primary school. Multisectoral early childhood development (ECD) programs have been promoted for the supposed benefits of collaboration between the health, education and nutrition sectors. However, there is a lack of sufficient evidence on the success of multisectoral integration (Alderman & Fernald, 2017).

CBCCs were developed to improve ECD by the Malawian Government over the past 30 years in concert with international partners. Despite the development of a National ECD Plan, financial investment by the Ministry of Gender and Social Welfare (MoGSW) in 2008-2009 was only \$120,000 USD, far short of the \$81 million dollars outlined in the Plan (Neuman et al., 2014). There are currently around 12,000 CBCCs in Malawi (Twalibu et al., 2017). CBCCs in Malawi provide spaces for ECD services but suffer from a lack of adequate support and resources (Shallwani et al., 2018). Additionally, many CBCCs are nonoperational for significant parts of the year, particularly during the lean season when communities are unable to provide meals (Neuman et al., 2014). As CBCCs have varying levels of operational capacity, a basic level of support was provided by Save the Children to both the treatment and control groups to ensure a basic level of CBCC function. This support was given to ensure the comparison between groups was not skewed by variation in the functionality of CBCCs.

The NEEP program was developed to operate through agriculture-nutrition pathways to achieve impacts on child diet diversity, anthropometry and other nutritional outcomes. These agriculture-nutrition pathways affect household and individual level factors that determine food access and consumption (Pingali, 2015). At the household level, income affects the ability to purchase food as well as micronutrient and food availability through access to diverse foods. To this end, the NEEP program distributed agricultural inputs for nutritious crops such as carrot, soybean, amaranth, tree fruit and sweet potato vines for households and for CBCC gardens. These inputs were intended to increase production of these nutritious crops to support consumption at the household level and in preschool meals for children aged 3-5 years. Small livestock in the form of baby chicks were also provided to households with the intention of improving access to animal-sourced food. Training seminars were provided on agricultural techniques such as improving yields, nutrition and hygiene knowledge and recipes for healthy meals. CBCCs functioned as a platform for the delivery of these capacity-building activities as well as the space in which community volunteers cared for children and prepared meals. Village savings and loan (VSL) groups were also promoted to aid in providing credit to households for investment in CBCCs and household businesses. Further details of the NEEP intervention are found in (Gelli, Margolies, Santacroce, et al., 2017a; Twalibu et al., 2017).

Study design and data collection

Ethical approval

This study received ethical review approval from the Institutional Review Board (IRB) of the International Food Policy Research Institute (IFPRI) as well as from Chancellor College, University of Malawi. Full informed consent was obtained from all respondents to household surveys.

Sample selection

This research was nested within a parent study, a cluster-randomized control trial (RCT) called the Nutrition Embedding Evaluation Program Impact Evaluation (NEEP-IE). NEEP-IE had

two treatment arms: a control group and a treatment group which received the NEEP intervention. The study design and sampling originate from the NEEP-IE technical note (Gelli & Roschnik, 2014). Sixty clusters were selected after stratification at the Traditional Authority (TA) level in the area covered by Save the Children in Zomba district. During this process, it was determined that CBCCs should be selected from primary school clusters instead of CBCC clusters to avoid contamination between treatment arms. This adjustment was determined as primary schools and CBCCs were found to be grouped together (Gelli et al., 2016). Clusters were then randomly assigned to treatment groups, with 30 clusters assigned to the treatment group and 30 clusters assigned to the control group (Gelli et al., 2016). Sample size calculations indicated a selection of 20 households per cluster. Power calculations were conducted using the 2010 Malawi DHS survey for dietary diversity for preschool children in the target age range (3-5 years). ICCs were adjusted after selecting clusters via primary schools, resulting in 80% power to detect a 0.24 standard deviation change between treatment arms (Gelli et al., 2016). Random selection of households was conducted from a household census listing by cluster, which identified households with children of preschool age. Calculations for the number of children of the targeted age per household are depicted below in Table 1 (Gelli & Roschnik, 2014).

Table 1. Sample Size

	Primary clusters	Communities / CBCCs	Households with children of target age	Children (0-5)	Children (3-5)	Girls (8-18)
Control	15	30	600	936	648	930
Intervention	15	30	600	936	648	930
Total	30	60	1200	1872	1296	1860

Note: Number of children estimated based on demographic data from DHS, 2010.

Source: NEEP Baseline Report, 2016 (International Food Policy Research Institute et al., 2016)

Data collection

Data were collected from three rounds of surveys at baseline in October-November 2015, midline in March 2016 and end line data collection in October-November 2016. The survey instrument for data collection was a household questionnaire administered to the principal caregiver of the household. Survey data was collected from 1,200 households. Questionnaires were compiled in Microsoft Excel and adapted for computer-assisted data collection devices with a local survey firm. A list of all household survey modules and a description of their content is provided in the Appendix. NEEP-IE documents provide further detail on data collection tools (Gelli et al., 2016).

Methods

Definition of the outcome variables

Assessment of the overall treatment effects on food security were measured by two primary household-level indicators, the Household Food Insecurity Access Scale (HFIAS) and the Household Diet Diversity Score (HDDS). A secondary outcome was a household coping severity score to measure program impacts on coping strategies.

Food security is difficult to assess with one indicator due to its complex and multidimensional nature. For this reason, several indicators were selected in order to measure the food access, stability and availability dimensions of household food security, with the inclusion of both experiential and consumption measures. Recent research has highlighted the need for multiple indicators. In a factor analysis, two latent dimensions of food security were revealed and weak associations between some food security indicators were found. The findings of this research showed that the coping strategies index (CSI) and the Household Hunger Scale (HHS - an abbreviated version of the HFIAS) correlated with quantity or the cost of limited access to food, and the HDDS and Food Consumption Score (FCS) correlated with diversity of diet (Vaitla et al., 2017). Taking these considerations to mind, as well as the lack of a gold standard for food security measurement, several measures were used in an

attempt to provide greater sensitivity to changes at the household level and to examine various domains of food security. These measures, shown in Table 2 below, included a perception-based scale (HFIAS) and a household dietary diversity score (HDDS), with a secondary analysis of the severity of household coping strategies used in response to shocks.

Table 2. Food Security Indicators

Primary Outcomes	Type	Measure	Domains
Household Food Insecurity Access Scale (HFIAS)	Experiential	Perceived household food insecurity	Quantity; Quality; Anxiety & Preferences
Household Dietary Diversity Score (HDDS)	Dietary	Dietary Diversity	Quantity; Quality
Secondary Outcome	Type	Measure	Domains
Coping Strategies	Severity of response	Coping strategies	Declines in food security status

The HFIAS is an experiential scale that assesses household food insecurity in three domains: anxiety about food, and the quality and quantity of food availability in the past 30 days. The HFIAS is a 9-question scale based on the experience of food insecurity with responses of 0=No, 1=Rarely, 2=Sometimes, and 3=Often. The sum of responses gives an overall score ranging from 0-27. Higher scores indicate higher food insecurity, with a score of 27 as the most severe (Leroy et al., 2015).

The HDDS is a score that measures the number of food groups consumed by the household. Thus, increases in HDDS indicate increased diet diversity - or the access component of food security. The HDDS does not have a determined cut-off for what is considered to be adequate diet diversity; rather, it seeks to define the household's ability to achieve a recommended quality and quantity of food (Leroy et al., 2015). The HDDS encompasses a range of 12 different food groups that represent dietary differences in macro and micro-nutrients. These food groups include: 1) Cereals; 2) Fish and Seafood; 3) Roots and Tubers; 4) Pulses, Legumes and Nuts; 5) Vegetables; 6) Milk and Milk products; 7) Fruits; 8) Oils and Fats; 9) Meat, Poultry and Offal; 10) Sugar/Honey; 11) Eggs and 12) Miscellaneous (Swindale & Bilinsky, 2006). Items included in the HDDS must be

adjusted to reflect local availability and food preferences. For the use of the HDDS in this study setting, during development of the household questionnaire foods from the Malawi Integrated Household Survey (IHS) were incorporated. A total of 115 food items were included in the list that were adjusted to local diets, with all food categories including cooked and prepared vendor foods that are common to the region. These items were then grouped by category, with a total score ranging from 0-12, with 12 as the highest possible score.

Coping strategies are household responses to surviving shocks such as loss of crops, death of family members or the destruction of dwellings due to disaster or fire. Coping is often measured as a composite index to assess the severity of responses to food insecurity or shocks. Although coping strategies can help a household rebound from a shock, they can also lead to declines in diet diversity, quality or quantity. Coping strategies are often examined as an early warning measure, flagging declines in food access. However, coping strategy measures cannot be used comparatively across contexts as they are grounded in local meaning, and are not to be used as descriptive measures of food insecurity. Coping strategies are best used as a component of a multi-indicator grouping of measures to assess food security.

Qualitative data is often used to inform the perceived severity of coping strategies for ranking and weighting (Maxwell & Caldwell, 2008). Likewise, qualitative data was used in this study to inform the weighting of coping strategies. Four focus group discussions (FGDs) including both men and women from treatment and control villages were conducted to rank coping strategies by perceived severity. FGDs were led by a trained facilitator in Chichewa and translated transcripts were utilized to calculate consensus scores for severity rankings¹². The coping strategies index (CSI) is calculated by conducting a 7-day recall of household coping strategies, after which the sum of

¹² A small number of severely ranked coping strategies mentioned in FGDs were not reported in data collection. These strategies – prostitution and early/child marriage – were not reported likely due to social stigma.

frequency of use of each strategy is multiplied by the severity weights for a composite score (Leroy et al., 2015). However, in this case, the frequency of coping strategies used was not recorded, thus the full index could not be created. Also, the recall period for shocks identified by the households covered 6 months in order to address the periods between waves of data collection. Thus, a weighted score using the qualitative severity ranking weights was used at the household level. Coping strategies were ranked according to the results of the focus groups and were assigned a weight from 0-4 in terms of severity. The household coping score was an mean score ranked by coping severity, thus a lower score indicated less severe coping strategies were used.

Statistical analysis

The impacts of the intervention were measured by examining mean outcomes between treatment groups at baseline, midline and end line surveys. The experimental design allowed for causal determination of program effect and assured that changes did not occur due to other factors beyond the intervention. This assertion rested on the assumption that randomization was successful. This analysis was conducted on the basis of the intent-to-treat (ITT) approach, which provided a conservative estimate of impact. The experimental design ensured that treatment assignment was not correlated with any unobserved factors. Randomization also addressed the endogeneity of program participation. The difference-in-difference estimator provided accurate estimates of program impact. According to the design of the trial, i.e., treatment assigned after the baseline measurements were recorded, we could assume that the baseline responses were independent of treatment assignment. To improve precision in the estimate of the treatment effect, or the difference in the mean change in the outcome from baseline to endpoint comparing the treatment to the control, the baseline response was included as an adjustment variable in a linear model for the endpoint outcome as a function of main terms for treatment and the baseline response (Colantuoni & Rosenblum, 2015). A description of the variables included in the model are detailed in Table 3.

$$Y_{i1} = \alpha_0 + \alpha_1 Y_{i0} + \alpha_2 G_i + e_i$$

Table 3. Description of variables in regression model

Variable	Description
Y_{i1} and Y_{i0}	Food security score measured at endpoint and baseline, respectively
G_i	Treatment assignment ($G=1$ if intervention, 0 if control)

Coefficients	Description
α_0	Mean food security score among control patients with baseline food security score = 0
α_1	Expected change in food security score at endpoint per unit increase in the food security score at baseline, holding treatment fixed
α_2	Difference across groups in the change in food security comparing baseline to end line
e_i	Error term

Impacts were measured with the use of a difference in difference (DID) estimator. The DID estimator defines the treatment effect as the average change in the outcome (Y) in the treatment group (T) minus the change in outcome in the control group (C): $\Delta^{DID} = E[(Y_1^T - Y_0^T) - (Y_1^C - Y_0^C)]$ (Gelli & Roschnik, 2014). The DID estimator was obtained from a linear mixed model for the end line outcome as a function of main terms for treatment and the baseline outcome as described above. Standard errors were adjusted for clustering at the primary school level, which was the level of randomization for the study, as well as at village and household levels. We excluded the treatment and baseline outcome interaction due to independence of the baseline outcome and treatment assignment. A subgroup analysis between treatment arms among female-headed households was also conducted.

The secondary analysis assessed an alternative measure of food security: the severity of household coping strategies. Household coping strategy scores were measured in those households that reported shocks at least at two time points. The secondary analysis was conducted using the same mixed model used for the primary outcomes, adjusted for clustering at cluster, village and

household levels. This model included the intercept, indicator terms for time period, and the interaction between time periods and treatment.

The treatment effect estimate is the main term for treatment in the linear model and is presented as the difference in scores comparing end line and midline to baseline across treatment arms. Statistical significance of the estimated treatment effect for each co-primary outcome, HFIAS and HDDS, were based on a 2.5% type I error rate to account for multiple comparisons (Bonferroni adjustment). Standard errors for the estimated treatment effect and 97.5% confidence intervals for the true treatment effect were reported. The secondary outcome was not adjusted for multiple comparisons, and was deemed statistically significant if the test yielded a p-value of <0.05 . Quantitative analyses were conducted using STATA software version 14 (College Station, TX).

Results

Descriptive baseline characteristics and comparisons by treatment group are presented in Table 4. Means were estimated with standard deviations and 95% confidence intervals for all continuous variables of interest. The average age of the household head was 36.47 years of age (sd: 10.47) and the mean household size had 5.33 (sd: 1.79) members, with 3.04 (sd: 1.33) children under the age of 14. Most households were monogamously married and of Christian faith. Household heads were traditionally male, but nearly a third of the sample was composed of female-headed households (27.96%). Households were predominantly of matrilineal descent (68.8%) - meaning land was inherited through the mother's lineage line rather than the father's - with small but significant differences in descent lineage by treatment group. The mean number of household plots cultivated by the treatment group (1.83, sd: 1.17) was significantly higher than the control (1.64, sd: 1.13, $p<0.01$). The treatment group also had significantly greater hectares cultivated (0.58, sd: 0.43, $p<0.001$) than the control (0.49, sd: 0.39) – a difference of 0.1 of a hectare ($\frac{1}{4}$ of an acre), which is qualitatively small.

Table 4. Baseline mean characteristics by treatment status

Characteristic	Overall		Control		Treatment	
	Obs(<i>n</i>)		Obs(<i>n</i>)		Obs(<i>n</i>)	
Age, household head (years) – mean ± SD	1,191	36.47(10.47)	596	36.22(10.25)	595	36.72(10.69)
Female head of household - %	1,191	27.96	596	29.19	595	26.72
Household size – mean ± SD	1,191	5.33(1.79)	596	5.36(1.68)	595	5.30(1.90)
Children in household (0-14 y.) - mean ± SD	1,191	3.04(1.33)	596	3.06(1.26)	595	3.01(1.39)
Dependency ratio (dependents to adults)	1,187	1.56(0.93)	593	1.57(0.92)	594	1.55(0.93)
Plots cultivated – mean ± SD	1,191	1.74(1.15)	596	1.64(1.13)	595	1.83(1.17)**
Hectares cultivated – mean ± SD	1,191	0.54(0.41)	596	0.49(0.39)	595	0.58(0.43)***
Marital status - %	1,188		595		593	
Unknown		0.70		1.20		0.20
Married, monogamous		73.40		71.10		75.70
Married, polygamous		2.90		3.50		2.40
Separated		5.60		6.20		4.90
Divorced		12.50		13.10		11.80
Widow		5.0		4.90		5.10
Religion practiced - %	1,188		595		593	
Traditional		0.30		0.20		0.30
Christianity		83.30		83.70		83.3
Islam		15.60		15.30		15.6
Other		0.80		0.80		0.80
Descent lineage - %	1,116		556	0.02*	560	0.02*
Matrilineal		68.80		72.80		64.80
Patrilineal		15.6		14.40		16.80
Matrilineal and Patrilineal		14.80		12.20		17.30
Other		0.80		0.50		1.10
Highest education attended by household head - %	1,159		579		580	
No education		8.50		8.60		8.30
ECD		0.20		0.20		0.20
Standard 1-4		24.50		21.90		27.10
Standard 5-8		42.30		42.10		42.40
Form 1-2		12.2		13.60		10.70
Form 3-4		11.9		12.80		11.00
Adult literacy		0.20		0.30		0.00
Training college		0.30		0.30		0.30

* $p < .05$, ** $p < .01$, *** $p < .001$ for difference between Treatment groups (Pearson's chi-square, Fisher's exact test, or *t*-test for independent samples, as appropriate)

Descriptive statistics on shocks and coping strategies that occurred during the study period can be found in the Appendix (Appendix Table 2). Across the sample, regardless of treatment status,

the most common shocks suffered by households were: crop loss due to flood or drought, damage to the home or other productive assets, crop loss for other reasons, and livestock disease or loss. The number of households reporting shocks was consistent across the three time periods over the course of the year. However, damage to the home or assets was reported by more households at baseline and subsequently declined over the year, likely due to the aftermath of floods in 2015. Table 5 shows the results of FGDs on ranking the perceived severity of coping strategies.

Table 5. Coping strategies grouped by perceived severity

Strategy, most severe (4)	Strategy, moderately severe (2-3)	Strategy, least severe (1)
Prostitution, early marriage	Borrowing, NGO/Group/Lender	Temporary migration for work
Land mortgage/lease/sale	Reduction in meals	Revenue-generating activities
Permanent migration	Support from family or friends	Mortgage consumption assets
Household member not working forced to work	Consuming low quality or non- preferred foods	Sold/mortgaged productive assets
Charcoal production	Removing children from school	
Sale of consumption assets (particularly maize) ¹³	Sale of consumption assets (particularly maize) ²	

The results of the regression analyses are shown in the tables below, with primary outcomes presented in Table 6 and the secondary outcome in Table 7. Sub-group analyses for both primary and secondary outcomes are presented in Table 8. Results are presented as difference-in-difference estimates by treatment group at baseline, midline and end line.

No significant impacts were found at either time point on either measure of food insecurity, neither the Household Food Insecurity Access Scale (HFIAS) nor the Household Diet Diversity Score (HDDS). The secondary analysis measured the severity of coping strategies. One category, the sale of consumption assets - understood primarily as “sale of maize” - caused disagreement between

¹³ Disagreements occurred in two of the FGDs by sex on this strategy’s ranking. The consensus score could be ranked in the most severe or the moderately severe categories. Both rankings were calculated with no significant differences found in results. Results from the secondary outcome are presented in Table 5.

men and women in two of the four focus groups to rank strategies. Thus, estimates were calculated for both alternative weightings of severity. Treatment effects of the program on average household coping strategies were not significantly different under a male-weighted nor a female-weighted score. As shown in Table 7, there was a statistically significant reduction in the mean household severity of coping score of -0.29 (-0.44, -0.13) at midline in the treatment group ($p < 0.001$). At end line, the difference between the treatment arms was -0.15, but the difference was not significant.

Impacts were also measured through sub-group analyses by sex of household headship. Tests of interaction were conducted to assess whether the treatment effect was different between these sub-groups, shown in Table 8. There was no significant difference between female-headed households in the treatment and those in the control group for the HFIAS score at either time point after adjustment for multiple comparisons. Likewise, no significant differences were found with the HDDS. Similarly, no statistically significant differences in HDDS were found between female-headed households between treatment arms at either time point.

Table 6. Average program impact on household food insecurity by treatment, over time

n=1,154	Baseline Mean(SD)	Change from baseline at mid-point			Change from baseline at end-point		
		Treatment Mean(SD)	Control Mean(SD)	Diff in Diff Est (95% CI)	Treatment Mean(SD)	Control Mean(SD)	Diff in Diff Est (95% CI)
HFIAS	13.31(7.84)	2.93(8.35)	4.32(8.42)	-1.69(-3.53,0.15)	1.86(9.00)	2.99(9.51)	-1.62(-3.46,0.23)
HDDS	6.89(2.16)	-0.11(2.38)	0.06(2.54)	-0.12(-0.57,0.36)	-0.02(2.57)	-0.32(2.55)	0.48(0.02,0.95)

◆ p-value for testing whether the difference in difference is 0 at mid-point, HFIAS: 0.07

+ p-value for testing whether the difference in difference is 0 at mid-point, HDDS: 0.65

◆◆ p-value for testing whether the difference in difference is 0 at end-point, HFIAS: 0.09

++ p-value for testing whether the difference in difference is 0 at end-point, HDDS: 0.04

Table 7. Average Program Impact on Mean Household Coping Strategies, over time

n=1,125	Baseline Mean(SD)	Change from baseline at mid-point			Change from baseline at end-point		
		Treatment Mean(SD)	Control Mean(SD)	Diff in Diff Est (95% CI)	Treatment Mean(SD)	Control Mean(SD)	Diff in Diff Est (95% CI)
Coping Severity	0.82(1.01)	-0.08(1.29)	0.06(1.49)	-0.29(-0.44, -0.13)***	0.4(1.36)	0.05(1.56)	-0.15(-0.31, 0.01)

* p-value for testing whether the difference in difference is 0 at mid-point: 0.00***

+ p-value for testing whether the difference in difference is 0 at end-point: 0.06

Table 8. Subgroup Analysis: Average Impacts on Primary and Secondary Outcomes between Female-headed Households by Treatment Group, over time

1° n=333 2° n=307	Baseline Mean(SD)	Change from baseline at mid-point			Change from baseline at end-point		
		Treatment Mean(SD)	Control Mean(SD)	Diff in Diff Est (95% CI)	Treatment Mean(SD)	Control Mean(SD)	Diff in Diff Est (95% CI)
HFIAS	15.63(7.61)	1.98(7.79)	3.03(7.93)	-1.05(-3.57, 1.07)	0.94(8.54)	1.77(8.99)	-1.19(-3.53, 1.15)
HDDS	6.38(2.06)	-0.04(2.25)	0.53(2.64)	-0.33(-0.95, 0.30)	0.07(2.47)	-0.14(2.59)	0.68(0.05, 1.30)
Coping Severity	0.84(1.05)	-0.19(1.38)	-0.07(1.43)	-0.20(-0.44, 0.03)	-0.08(1.39)	0.01(1.40)	0.05(-0.19, 0.29)

◆ p-value for testing whether the difference in difference is 0 at mid-point, HFIAS: 0.29

+ p-value for testing whether the difference in difference is 0 at mid-point, HDDS: 0.31

◆◆ p-value for testing whether the difference in difference is 0 at end-point, HFIAS: 0.32

++ p-value for testing whether the difference in difference is 0 at end-point, HDDS: 0.04

* p-value for testing whether the difference in difference is 0 at mid-point, CS: 0.09

** p-value for testing whether the difference in difference is 0 at end-point, CS: 0.70

Discussion

Nutrition-sensitive agricultural programs show promise for improving food security, nutrition and other health outcomes by addressing food availability, access and utilization. While the focus of many program evaluations is often nutritional status, a recent review of 50 agriculture-nutrition program evaluations drew the conclusion that the focus on nutritional outcomes should be shifted to those of diet and food access (Herforth & Ballard, 2016). This paper focused on indicators of food access and household food insecurity.

The impacts of nutrition-sensitive agricultural programs have been mixed, with varying success according to context and program design. Positive impacts of nutrition-sensitive agriculture programs on diversity of production and consumption have been found for biofortified crops, and for increased consumption of nutritious foods. A program in Kenya that promoted orange-fleshed sweet potato (OFSP) increased Vitamin A intake for mothers and infants (Webb Girard et al., 2015). A homestead food production and nutrition education program in Nepal did not affect child growth but lowered anemia among children 12-48 months and their mothers, as well as improved mothers' underweight (Osei et al., 2016). Another program based on school gardens with behavior communication change (BCC) in Burkina Faso led to diversified household production and improved diet quality (Olney et

al., 2015). However, this program's BCC affected spending on nutritious foods, so improvements in diet occurred through knowledge and preferences rather than just increases in production (Dillon et al., 2018). These studies show that production of nutritious foods does not guarantee diet diversity. Also, diet diversity may improve for some individuals in a household, and for not others, depending on intra-household allocation of food, member's social status and others. A program in Zambia increased household production of nutritious crops, increasing household food access, but children's diet diversity did not improve (Rosenberg et al., 2018). Conversely, a program in Ghana providing garden and poultry farming support with nutrition trainings saw significant impacts on length-for-age and height-for-age z-scores and minimum diet diversity for young children (Marquis et al., 2018).

The results of the NEEP program provide further insights into the growing body of research on nutrition-sensitive agricultural programs. However, our results mirror the evidence in that they show mixed effects. The NEEP program was designed to improve household and CBCC-level diversity of production, diet and consumption of nutritious foods, therefore improving child diet diversity, nutritional status and child development. This study followed the program over three time periods and two agricultural seasons. However, the primary food security indicators did not show treatment effects in either the HDDS or the HFIAS over the period of intervention.

There are several possible reasons that program impacts were not seen on the primary household food security measures. As the HDDS measures increases in the number of food groups consumed, it is possible that some nutritious crops were included in food categories that the household already consumed. For example, the Vitamin-A enriched *Mthikinya* orange maize promoted by NEEP would have a positive nutritional effect if consumed. Yet consumption of orange maize would not increase the HDDS because all households regularly consume the nutrient-poor yellow maize as the principal staple food. Thus, cereals would already be included as a food group in the household diet. Secondly, the program was designed to promote donations of food

produced by the household to preschools. Food quantity and access at household level could have been affected by CBCC donations, which ultimately benefited children attending the centers.

Thirdly, another reason may be the specific indicators measured. These measures examine only household level food security and not how individuals within the household may have benefited. To this end, it would be helpful to examine whether mothers in treatment households saw increased body mass index (BMI) or diet diversity, as maternal nutrition status at conception and during pregnancy is an important factor in birth outcomes and neonatal health (King, 2016; Kramer, 1987).

Lastly, it would be expected that lesser changes in diets or food security would be seen at midline, after only 6 months of intervention. At this time, most households had just planted crops associated with the program. Those crops were not harvested prior to the midline survey as the harvest period falls after the lean season. However, crops harvested post-lean season would have been consumed prior to the end line. Nonetheless, there were no significant effects of the program on household diet diversity at either period using a conservative adjustment for multiple comparisons.

Households in Southern Malawi suffer from seasonal covariate shocks as well as idiosyncratic setbacks due to poverty and other risks. Shocks have a negative impact on food security, as they can rapidly diminish household assets and productivity. Mean household coping scores were measured to examine if the program affected the severity of coping strategies used. Significant treatment effects were found in reducing the severity of household coping strategies during the lean season. Reducing highly detrimental coping strategies such as permanent migration, removing children from school to work, or selling food stocks prevents declines in household welfare. The protective effects of the program on coping is promising, as it reduces household vulnerability, precluding further erosion of wellbeing or susceptibility to future shocks. Measurement of the impacts of nutrition-sensitive agricultural programs on coping is not as common as the use of the HFIAS and HDDS, but these results provide a reason to further investigate how programs might improve household coping

strategies. It would also be advantageous to conduct a greater number of focus groups to inform the severity rankings and to disaggregate groups by gender. In this study, women believed that selling the staple crop, maize, was a very severe strategy, while men weighed this category as less severe. This is an area for further study: to examine if sex-weighted scores affect perceived coping severity differently.

Agriculture-nutrition programs are mediated by dynamics such as social and gender norms. We conducted sub-group analyses to examine any differential effects between female-headed households in the treatment and control groups. Female-headed households are uniquely vulnerable to shocks (Campus & Giannelli, 2016) due to lack of kin support, economic vulnerability, and discrimination (Buvinic & Gupta, 1997). Female farmers have been found to have lesser physical and human capital than their male counterparts, such as smaller landholdings (Quisumbing et al., 1995). Single-parent households have been found to be more vulnerable to weather events such as variation in rainfall, but female-headed households are even more vulnerable to declines in income from shocks (Flatø et al., 2017). In Malawi, male-headed households were associated with greater increases in diet diversity scores and had a slightly higher inclination to diversify household production (Aberman & Meerman, 2015). Conversely, the association between farm diversity on diet diversity has been found to be higher in female-headed households than in male-headed households in Malawi (Jones et al., 2014) and in Kenya (Romeo et al., 2016). Also, data from Malawi has shown that while *de facto* female headed households are poorer than other households, preschoolers in their care had better nutrition status (Kennedy & Peters, 1992). These mixed results on the vulnerability of female-headed households raise the question of how programs may have had differentiated impacts.

There appears to be little research on effects of nutrition-sensitive agricultural programs on female-headed households or households where the male head is absent. One study, while it did not examine female-headed households *per se*, surveyed men and women in a household separately, assessing gendered intra-household treatment effects. While asset ownership remained in male

hands, qualitative positive changes occurred around norms of women's asset ownership (Van Den Bold et al., 2015). In our results, no significant differences were found by treatment group between female headed households for household food security (HFIAS), diet diversity (HDDS) or coping severity. This result could in part be due to the small sample ($n=307$) of female-headed households.

Despite the lack of impacts on household food security outcomes in this study, other research on the NEEP program found positive effects on other nutrition-related outcomes. Mean household crop diversity and production of nutritious foods promoted by the program - including brown beans, pigeon peas, groundnuts, soybeans and eggs significantly increased in treatment households (Gelli, Margolies, et al., 2018). Further, increased diet diversity and nutrient intakes were found in preschool children in treatment villages and their younger siblings experienced increased height-for-age z-scores (Gelli, Margolies, et al., 2018). These results suggest the program increased availability and consumption of nutritious food, particularly for children. This suggests the importance of preschools as a vehicle for the program and as a staging area outside the household for child nutrition. Also, it should be noted that while under the multiple comparisons' assumption, program impacts on diet diversity were not significant, under a standard p-value threshold ($p < 0.05$), as used in other research on this project, there was a small but significant increase in the diet diversity score in the treatment group ($p=0.04^*$) relative to the control group. The size of the impact in this case (0.48, sd: 0.24), indicated the addition of half a new food group, which is a small but meaningful shift in diet diversity in this context as few food groups are typically consumed.

Finally, the program was implemented during a very poor agricultural year. This intervention scenario could be considered a worst case, testing the success of the agricultural component of program under harsh conditions. However, under current climate change projections, these conditions should be assumed to occur more frequently, becoming increasingly unpredictable over time. Thus, agricultural sustainability will continue to pose a challenge for the success of nutrition-sensitive

agricultural programs in Malawi and in other countries. Over time, increasing nutrient depletion has occurred in Malawian soils from crop removal and erosion, and there has been decreased intercropping because of limited land availability (Carr, 2017). Weather and rainfall variability will limit the success of agriculture-based programs that rely on rainfed agriculture with limited inputs. That said, NEEP and other programs should continue to promote conservation agriculture (CA) techniques and to expand their training portfolios. In addition to the nutritional benefits of crop diversification, intercropping reduces vulnerability to climate, increases resistance to pests, benefits the soil, and reduces variability in income gained from crops as compared to maize monocropping (Maggio et al., 2018). CA techniques such as intercropping and diversification tested in Malawi during the El Niño period improved systems' resistance to climate stress (Steward et al., 2018). Continued promotion of diverse, drought-tolerant nutritious crops, agroforestry, permaculture and grey-water reuse could aid in preparing farmers for the increasing agricultural and climate challenges they will face in the future (Rivett et al., 2018). However, it must also be remembered that agricultural techniques cannot substitute for investments in human and social capital (Schaafsma et al., 2018); the other critical component of nutrition-sensitive agricultural programs.

Strengths and Limitations

This study had some limitations pertaining to measurement. Scale and score-based measures can experience floor and ceiling effects. For example, households at the “peak” of the scale cannot register increases. However, at baseline there were no ceiling and floor effects in the primary indicators. Secondly, it was not possible to incorporate additional measures of food security due to limitations of available data. However, with the use of the HFIAS and HDDS, impacts were examined from an experiential standpoint focused on access and availability as well as a consumption-based measure. The HFIAS has been validated as a reliable measure of household food security in differing developing country contexts and particularly in Sub-Saharan Africa

(Becquey et al., 2010; Knueppel et al., 2010), yet does not appear to be valid *across* contexts for purposes of comparison (Deitchler et al., 2010). This study did not compare measures across contexts. A recent paper found the HFIAS was better confirmed in comparison with other food security measures such as the HDDS and Food Consumption Score (FCS) (Maxwell et al., 2014). However, using measures of diet quality such as the HDDS might also be limiting. Access to diverse foods in this setting are limited and increases in diversity may only occur for a small number of foods or in those food categories already consumed by households.

Additionally, it is important to note that measurement of the severity of coping strategies does not have validity beyond this context. Another limitation is that data was not available on the frequency of coping strategies, thus use of the Coping Strategies Index (CSI) was not possible. However, coping strategies were ranked into a weighted score, allowing for the determination of severity of strategies employed to address shocks. In terms of generalizability of results, the study population was representative of other smallholder communities in Malawi and could be applicable to other Sub-Saharan settings. That said, caution should be taken with the assumption of the external validity of RCTs based solely on high internal validity (Deaton & Nancy, 2018).

Conclusion

The NEEP program did not have significant treatment effects on two primary measures of food security. This could be due to measurement issues or because nutritional benefits were directed to the individual level instead of the household level. However, the program had significant effects on diminishing the severity of household coping strategies during the lean season, a period when households are most vulnerable. Subgroup analyses showed no significant differences of the program on these food security measures between female-headed households in the program and those in the control. Finally, nutrition-sensitive agriculture programs should anticipate the effects of climate change through preparation for pests, drought, floods and declines in crop nutrient content.

Appendix

Appendix Table 1. NEEP-IE Household Questionnaire Modules (Gelli et al., 2016)

Questionnaire	Module	Description
CBCC	Location & access	Identification, location
	Infrastructure	Physical infrastructure, including learning space, water and sanitation, cooking and storage facilities
	Staff	Staff roster, education and training
	Curriculum & services	Quality of CBCC activities and related services
	Caregivers health & nutrition knowledge	Knowledge related to optimal infant and young childcare and feeding practices.
	Health and hygiene practices	Health and hygiene practices of CBCC staff
	Meal provision	Meal quality, portion sizes, meal planning, management and distribution
	Food procurement	List of food procured/sourced by the CBCC
	Garden land	Land used by CBCCs, including ownership and use, size of the plot, crops planted input and labour for each plot
	Garden production	Crop production and use
	Garden sales	Crop sales, volumes and prices
	Food storage	Food storage infrastructure and practices
Household	Roster	Listing of demographic characteristics of household members
	Dwelling characteristics and assets	Basic features of the household's primary dwelling place, including infrastructure, access to water and electricity
	Assets	Assets owned (by men and women separately)
	Land	Land owned and used by household's women and men, including ownership and use, size of plot, crops planted, labour for each plot
	Agricultural production	Crop production and use
	Agricultural marketing	Crop sales, volumes, prices,
	Agricultural storage	Storage volumes and management
	Farm investments	On-farm investments and labour
	Farming practices	Pre- and post-harvest practices
	Livestock	Livestock holdings, revenue and costs, women ownership
	Employment & business enterprise	Non-farm sources of income (including employment), costs, male and female members
	Shocks	Unexpected events that may have influenced household's well-being and responses taken by household

Caregiver	Food security	Household vulnerability with respect to food frequency
	Food expenditures	Food expenditures and quantities consumed at household level.
	Non-food expenditures	Expenditures on household items, clothing and personal expenditures over the last month.
	Caregivers health and hygiene	Health and hygiene related questions
	Caregivers health & nutrition knowledge	Knowledge related to optimal infant and young childcare and feeding practices.
Child	Caregivers IYCF practices	Infant and child feeding practices
	Childcare practices	Childcare practices, including support for learning and stimulation
	Women's time allocation	Women's use of time, perceptions on women's time use
	Child health	Child immunisation history and health related questions
	Dietary assessment	Interactive 24hr recall on food intake for children 3-5 years.
	Anthropometry	Physical measurements of all children and their parents.
	Development	MDAT scores (fine and gross motor, language and social domains)

Appendix Table 2. Descriptive statistics of household shocks and coping strategies

Characteristics	Overall			Control			Treatment		
	Baseline (n=1113)	Midline (n=1097)	Endline (n=1093)	Baseline (n=569)	Midline (n=545)	Endline (n=540)	Baseline (n=544)	Midline (n=552)	Endline (n=553)
	Mean(sd)			Mean (sd)			Mean (sd)		
Shocks									
Death, income earner	0.03(0.18)	0.01(0.10)	0.02(0.12)	0.04(0.20)	0.01(0.09)	0.01(0.11)	0.03(0.16)	0.01(0.10)	0.02(0.13)
Death, other adult	0.02(0.14)	0.01(0.07)	0.01(0.12)	0.02(0.13)	0.01(0.07)	0.02(0.13)	0.02(0.15)	0.01(0.07)	0.01(0.10)
Chronic ill., adult	0.11(0.31)	0.10(0.30)	0.08(0.28)	0.11(0.31)	0.08(0.28)	0.01(0.30)	0.10(0.30)	0.11(0.32)	0.06(0.24)
Loss of employment	0.04(0.19)	0.04(0.19)	0.04(0.20)	0.04(0.19)	0.04(0.19)	0.06(0.24)	0.04(0.20)	0.04(0.20)	0.02(0.15)
Divorce	0.07(0.26)	0.04(0.19)	0.06(0.24)	0.07(0.27)	0.03(0.17)	0.06(0.24)	0.07(0.25)	0.04(0.20)	0.07(0.25)
Crop loss, flood/etc	0.84(0.37)	0.93(0.26)	0.95(0.21)	0.85(0.36)	0.93(0.25)	0.96(0.21)	0.82(0.39)	0.92(0.27)	0.95(0.22)
Crop loss, other	0.24(0.43)	0.28(0.45)	0.16(0.37)	0.26(0.44)	0.19(0.39)	0.12(0.34)	0.23(0.42)	0.37(0.48)	0.20(0.40)
Livestock sick/loss	0.21(0.41)	0.22(0.41)	0.27(0.45)	0.18(0.38)	0.16(0.36)	0.17(0.38)	0.24(0.43)	0.28(0.45)	0.37(0.48)
Damage, home or prod. assets	0.40(0.50)	0.08(0.27)	0.13(0.34)	0.42(0.50)	0.08(0.27)	0.13(0.34)	0.37(0.49)	0.08(0.27)	0.13(0.34)
Theft, loss of food	0.11(0.32)	0.09(0.29)	0.07(0.26)	0.11(0.32)	0.11(0.31)	0.08(0.28)	0.11(0.32)	0.07(0.26)	0.06(0.24)
Bankruptcy	0.12(0.32)	0.15(0.36)	0.14(0.34)	0.12(0.33)	0.15(0.35)	0.13(0.34)	0.11(0.31)	0.16(0.37)	0.14(0.35)
Conflict, legal	0.03(0.17)	0.03(0.18)	0.02(0.12)	0.03(0.18)	0.03(0.16)	0.02(0.12)	0.03(0.16)	0.04(0.20)	0.02(0.13)
Shock, other	0.01(0.12)	0.02(0.14)	0.01(0.08)	0.01(0.08)	0.02(0.15)	0.01(0.11)	0.02(0.15)	0.02(0.13)	0.00
Coping strategies									
Sold land	0.00	0.00	0.00	0.00	0.00	0.00	0.01(0.07)	0.00	0.00
Land mortg/lease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sold product. asset	0.03(0.16)	0.03(0.17)	0.03(0.21)	0.02(0.15)	0.01(0.11)	0.04(0.20)	0.03(0.18)	0.04(0.21)	0.03(0.22)
Mortgaged prod. assets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sale, consum. asset	0.02(0.13)	0.02(0.13)	0.03(0.23)	0.01(0.11)	0.02(0.13)	0.04(0.26)	0.02(0.15)	0.02(0.13)	0.01(0.20)
Mortgage cons. asset	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Borrowed, NGO	0.01(0.09)	0.00	0.00	0.01(0.07)	0.00	0.01(0.10)	0.01(0.11)	0.01(0.07)	0.00
Borrowed, group	0.02(0.17)	0.04(0.20)	0.06(0.30)	0.03(0.18)	0.03(0.18)	0.07(0.34)	0.02(0.16)	0.05(0.23)	0.05(0.25)
Reduced food consumption	0.10(0.38)	0.08(0.28)	0.24(0.53)	0.10(0.34)	0.07(0.27)	0.22(0.51)	0.1(0.42)	0.08(0.28)	0.26(0.54)
Consumed low quality food	0.08(0.34)	0.06(0.24)	0.19(0.54)	0.09(0.33)	0.06(0.26)	0.19(0.54)	0.06(0.35)	0.05(0.22)	0.20(0.53)
Remove children from school	0.00	0.00	0.01(0.12)	0.01(0.07)	0.01(0.07)	0.01(0.13)	0.00	0.00(0.04)	0.01(0.10)
Migration for work, temporary	0.07(0.30)	0.03(0.20)	0.05(0.30)	0.07(0.28)	0.04(0.24)	0.06(0.35)	0.08(0.31)	0.03(0.16)	0.04(0.23)
Migration to work, permanent	0.01(0.09)	0.00	0.01(0.10)	0.01(0.07)	0.00	0.01(0.07)	0.01(0.11)	0.00	0.01(0.11)
Move, household	0.03(0.18)	0.00	0.00	0.04(0.21)	0.00	0.01(0.09)	0.02(0.15)	0.00	0.00
Other revenue-generating activity	0.57(0.92)	0.32(0.60)	0.55(0.86)	0.66(0.99)	0.35(0.61)	0.66(0.93)	0.48(0.82)	0.29(0.60)	0.43(0.77)
Non-working memb. must work	0.09(0.34)	0.07(0.31)	0.18(0.66)	0.12(0.40)	0.08(0.35)	0.25(0.77)	0.06(0.28)	0.05(0.26)	0.12(0.53)
Help, fam/friends	0.13(0.42)	0.13(0.37)	0.23(0.60)	0.14(0.46)	0.13(0.37)	0.26(0.64)	0.11(0.37)	0.12(0.37)	0.20(0.57)
Strategy, other	0.24(0.55)	0.22(0.52)	0.09(0.32)	0.18(0.47)	0.20(0.47)	0.09(0.29)	0.29(0.61)	0.25(0.56)	0.09(0.34)

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CHAPTER 4: A modern moral economy? Food security, village governance and development aid in Southern Malawi¹⁴

¹⁴ Preliminary results of this study were outlined in a policy note for the Malawi Strategy Support Program: Margolies, A., Aberman, N., Gelli, A. (2017). Traditional Leadership and Social Support in Southern Malawi. MaSSP Policy Note 30, IFPRI.

Abstract

Background: This study investigated the role of sociocultural norms and local governance in influencing household food security and nutrition in Southern Malawi. Malawi suffers from persistent high rates of child malnutrition and food insecurity. These problems are exacerbated by increasing pressures of land scarcity, the effects of climate change on smallholder farmers and by chronic seasonal hunger. Efforts by the international community and national government have alleviated short-term and emergency needs but have failed to ensure longer-term food and nutrition security. Household diets are affected by cultural and social traditions, as well as norms defining access to resources. **Methods:** Longitudinal qualitative data over two seasons was collected from households in agricultural villages in Zomba District, Southern Malawi. Households were selected using purposive sampling and stratification by food security status. Two rounds of thirty-eight in-depth interviews were conducted with men, women, and female adolescents in six villages. Interviews were also conducted with chiefs from each village. **Results:** Social obligations, kin dynamics, and village-level governance played an important role in determining resource allocation and revealed a morality of sharing during scarcity. Sharing practices were influenced by resource origin and type, seasonality and the influence of local leaders. Increasing scarcity of land, migration to urban areas and other cultural shifts exposed ongoing tensions between traditional, community-based mechanisms of social protection, and modern forms of external support. **Conclusion:** Sociocultural norms and the intervention of village chiefs affected sharing practices, and, in turn, household food security. Moral economy dynamics influenced community perceptions of interventions and their efficiency in achieving desired outcomes. These results provided insights to better adapt development programs and policy to cultural dynamics for improved food security.

Introduction

Malawi suffers from persistently high rates of child malnutrition and food insecurity. These problems are exacerbated by population growth, land scarcity and climate change (Carr, 2014). Malawi's rural population is primarily composed of poor smallholder farmers who are most vulnerable to these negative effects. These households also have low nutrient-density maize-based diets (Dickenson et al., 2009). Cyclical hunger is punctuated by shocks such as weather events or crop loss, occurrences which can trigger irrecoverable declines in welfare. In this context, agricultural households' access to production and consumption resources is essential to resilience to shocks. Almost 50% of children under five years of age suffer from chronic malnutrition. Stunting affects 37% of children under five, with higher rates in rural areas (Government of Malawi, 2016). This study took place in Zomba District, which has an under-five mortality rate of 134 per 1,000, well above the national average. In addition, 23% of child mortality in Malawi can be associated with malnutrition (United Nations Office for the Coordination of Humanitarian Affairs, 2014).

Although rural agricultural villages in Malawi suffer from chronic food insecurity, they are also recipients of significant amounts of aid. In 2016, the Government of Malawi (GoM) declared a National Disaster after widespread flooding (Government of Malawi, 2015). The response to this crisis was the largest in Malawi's history. The Malawi Vulnerability Assessment Committee (MVAC) estimated a cost of US \$395 million to assist 6.5 million people (Government of Malawi, 2015). The crisis response delivered cash, in-kind food transfers and maize vouchers (Malawi Vulnerability Assessment Committee, 2017). The mobilization of diverse forms of aid left questions unanswered about which approach best supported resilience and longer-term food insecurity.

Ongoing debate in Malawi has focused on the failures of humanitarian aid to prevent future crises. The GoM and development partners are interested in how to strengthen the social support system. Humanitarian aid can increase the adaptive capacities of communities through resource

transfers. Yet, aid can also reinforce or undermine local support systems. Research on this topic has often underemphasized sociocultural dynamics (Hoddinott, 2014). However, informal support is essential to the food security of subsistence households (Bezner Kerr, 2005a). Non-market transfers are critical to food security in Sub-Saharan Africa (Adams, 1993; Longhurst, 1986). However, international organizations and Government also provide programs driven by external objectives and selection criteria. These programs generally operate without linkages to customary systems of informal social protection. Formal transfers may crowd out informal support (Devereux & Getu, 2013a), or aid may be diverted into social or kin networks. The relationship between formal and informal mechanisms of social support is often overlooked in program design and delivery. These dynamics could help to explain why aid may have been ineffective in reaching beneficiaries.

Resource sharing provides an informal safety net against shocks and seasonal deprivations. Community sharing norms are guided by providing for others even when resources are scarce. Informal resource distribution mitigates risks whilst maintaining relationships, strengthening reciprocal obligations through redistribution to kin, family, and others (Devereux & Getu, 2013b). This *moral economy* upholds a “subsistence ethic”, or a right to subsistence, under a “norm of reciprocity”, which functions as a form of social insurance (Scott, 1977). Reciprocity spurs social interaction and supports networks, mitigating risks (Gouldner, 1960). Reciprocity in the form of exchanges and pooling (Sahlins, 2017) are products of social and economic pressures (Thompson, 1971), such as in collective mobilization (Wolford & Nehring, 2013). Further, gift-giving has symbolic and practical value in expressing solidarity and creating social debts (Mauss & Cunnison, 1954) that play key roles in social, economic and political life (Malinowski, 1950). Reciprocity and morality also influence food security status (Mintz et al., 2002). However, increased poverty and land scarcity have been associated with declines in social cohesion and informal exchange.

This paper presents qualitative results that examine sociocultural factors influencing resource sharing and food security, focusing on the role of village leadership. This study was nested within a mixed-methods longitudinal evaluation of a nutrition-sensitive agricultural program delivered through community-based childcare centers (CBCCs). The Nutrition Embedding Evaluation Program (NEEP) covered 1,199 households in Zomba District. Complete information on the NEEP-IE trial is found in (Gelli, Margolies, Santacroce, et al., 2017b). Program and policy implications are discussed in light of these findings.

Methods

Study design

Household case studies followed eighteen households over two agricultural seasons. Initial data collection was conducted in March 2016 and follow-up interviews were conducted in October 2016. Individual and household level perspectives were captured through gender-disaggregated in-depth interviews (IDIs) with household heads and spouses. Instruments were informed by Sen's capabilities approach to assess individual, community or external resources (Sen, 2000). IDIs explored perceptions of food security, coping strategies and the role of development programs. Direct household observations were also conducted. IDIs were also conducted with traditional leaders at follow-up to examine the role of leadership in resource distribution.

Sampling

Sampling was purposive, using a sub-sample from the parent study. The use of the RCT sub-sample was a deliberate design choice as research focused on factors affected by the program. Maximum variation sampling was used, stratifying households by food security status and demographic characteristics. Six villages were selected from CBCC clusters, with three villages chosen from each treatment arm. Three households per village were selected for a total of 18

households. Diverse household types were included in the sample from each village: polygamous households, male and female-headed households, and households with female adolescents.

Respondents were re-interviewed after six months. Figure 11 details sample composition by cluster, village, household and respondent type.

Figure 11. Sampling Diagram

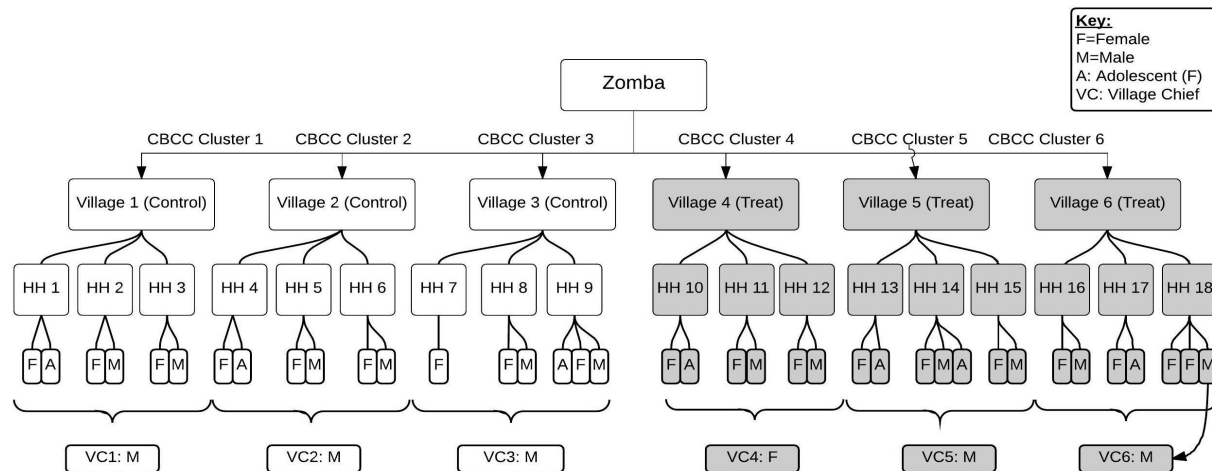


Table 9 below contains household demographic details. Baseline food security status was used to stratify households on low, medium and high scores for sampling purposes.

Table 9. Household sampling characteristics, baseline

	HH	Treatment	Female head	Male head	Adolescent	Polyg	LNS	School Meals	Seeds	Credit	FISP	Food Insecurity
Village 1	1	X	X		X			X				High
	2	X		X				X		X	X	Med
	3	X		X				X			X	Low
Village 2	4		X		X						X	High
	5			X								Low
	6			X			X					High
Village 3	7			X	X				X		X	Low
	8		X									High
	9			X								Med
Village 4	10	X			X							Med
	11	X	X								X	Low
	12	X		X								High
Village 5	13			X				X			X	Med
	14			X				X				Low
	15		X		X				X			Med
Village 6	16	X		X		X						High
	17	X	X		X			X				High
	18	X		X								Low

*FISP: Fertilizer Input Subsidy Program, LNS: Lipid-based Nutrient supplements, Polyg: Polygamous household

*Household Food Insecurity Access Scores (HFIAS) were used to stratify by tercile of food insecurity status

Table 10 shows selected mean household characteristics at baseline (n=18). The average household in our sample had 6.16 members, with a mean food security score of 15.6 (on a 27-point scale), of Christian faith (56%) with a head of household of 41.3 years of age.

Table 10. Selected Household Characteristics at baseline, 2015

	mean(sd) or n(%)
Household size	6.16 (2)
HFIAS score	15.6 (8.2)
Households receiving FISP	6 (33%)
pc daily energy intake	1701.2 (1169)
Female headed households	6(33%)
Religion practiced	
Christian	10(56%)
Muslim	8(44%)
Age of household head	41.3(8.2)

Data Collection

A total of 38 in-depth interviews were conducted during the first round of data collection, with follow-up interviews conducted six months later. All households were successfully re-contacted and interviewed. Some respondents had relocated due to travel, temporary or permanent migration. Relocated respondents (n=3) were found and interviewed on site. The chief was interviewed every village sampled (n=6). In one case (Village 6), the chief was a member of a household selected into the original sample. Thus, this respondent was interviewed about his household as well as content regarding his role as chief. Audio recorded interviews were conducted in Chichewa. Recordings were transcribed from Chichewa and translated into English.

Ethical considerations

Institutional Review Board approval was obtained through IFPRI and Chancellor College, Malawi. Village chiefs were informed in advance of the arrival of enumerator teams. Informed verbal consent was acquired and participation was voluntary. De-identified transcripts were stored in a password-protected archive.

Data analysis

Transcripts were thematically coded in NVivo. The *framework approach* to qualitative data management (Gale et al., 2013) facilitated thematic and explanatory analyses. Ordering by case and theme allowed for pattern identification across cases, respondent types and social grouping. Exploratory analyses examined the response range and identified patterns, using categorization, classification and summarizing. Additional themes were added as necessary. The secondary analysis stage took a deductive, explanatory approach to understanding relationships between trends.

Results

Results on the sociocultural dynamics of resource sharing and effects on food security are presented below. These dynamics include how resource allocation occurs within the village, distinguishing between how resources from inside the community are treated differently from those originating from outside sources. External resources, such as development aid, are affected by informal redistribution processes at the village level. Understanding the role of chiefs as leaders in these communities aids in interpreting how they influence resource re-distribution, and how these dynamics affect the food security of agricultural households.

Resource distribution and sharing in sociocultural context

Rural villages in Malawi rely on agriculture for subsistence. These communities depend on resources produced by their households, suffering cycles of scarcity with seasonal changes of the

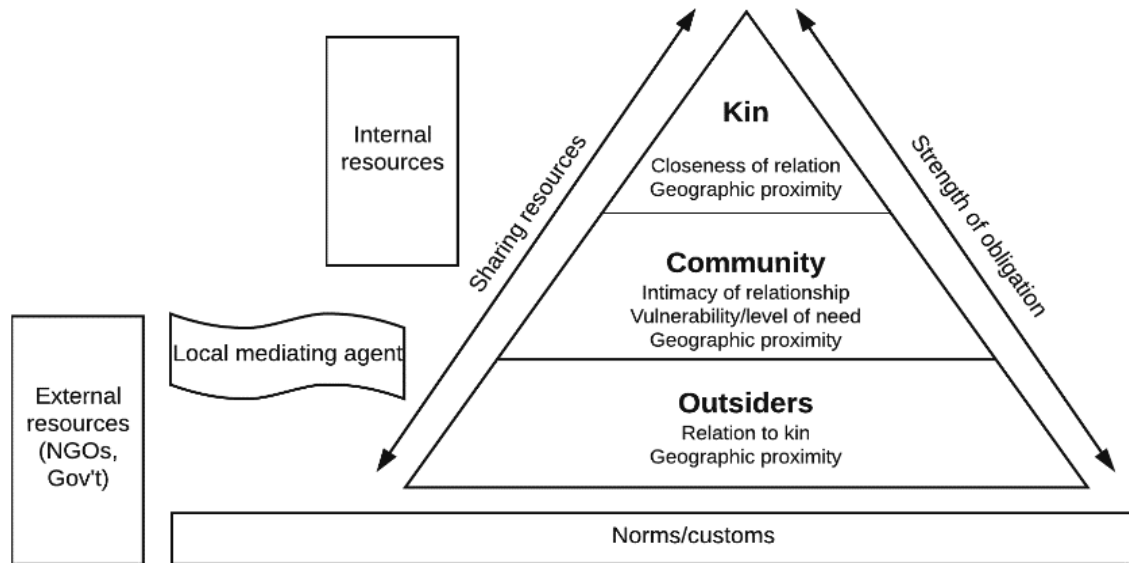
agricultural calendar. Subsistence communities have long struggled with periods of hunger, and have developed systems of mutual support to cope with the challenges. In interviews, villagers openly reported that long-held cultural practices encouraged resource sharing within the community. Sharing was said to solidify reciprocal relationships, sustaining ties with kin and neighbors. Respondents reported that social pressure and stigmatization by other community members encouraged, punished and upheld these practices. Villagers also related that they felt social obligations to help others in the community.

The frequency of sharing and quantities shared was affected by resource availability. The 2015-2016 agricultural season had devastating effects in the villages. Respondents bemoaned that informal support networks were tested because of scarce resources. *"Especially this year, I have never seen it before. Eb! You can't even go to another household for help and be assisted! This year is too much! We don't know how to escape it"* (Male respondent, Village 3). Sharing was reported to be diminished to a fewer number of individuals who had greater kin proximity. The unusual phenomenon of begging was also reported. Vulnerable households appealed for help despite the perceived indignity of such requests; *"If the parents hide that there is a shortage of food at home, it will be the kids who will show that there is actually no food through crying for food at the neighbors' homes. Then the neighbor actually comes in to help"* (Female respondent, Village 4).

Figure 12 depicts a hierarchy developed from respondent explanations of sharing practices. This figure shows the dynamics of both external aid and internal resources originating from communities. This figure depicts the prioritization of resource sharing practices: with closest kin and neighbors most highly prioritized, and showing diminishing obligation to share as the strength of relationships weakened. Thus, the strength of obligation to share was based on relational proximity, with outsiders least prioritized. Other considerations that affected sharing were the level of intimacy with the other individual and geographic proximity. For example, close neighbors were considered

over those who lived farther away. Secondly, villagers said certain easily identifiable groups such as the disabled, orphans and the elderly were shared resources due to their perceived economic and social vulnerabilities.

Figure 12. Resource sharing hierarchy



Source: (Margolies et al., 2017)

The figure also explains differences in sharing practices depending on the origin of the resource. Resources were distinguished as internal, if produced by the labor of the community or household, or external, if delivered by international organizations or the Government. Individuals commonly shared small quantities of internal resources between households. This type of sharing depended on intra-household dynamics and individual control over the resources. Individual exchanges were not pooled as with external resources such as aid. Sharing to non-kin was also deemed important as it provided a broader social network for risk protection; *“I share with my relatives and friends a variety of things that I have got. That is how I build relationships with people by sharing with people that I am not related to”* (Male respondent, Village 4).

External resources, provided as humanitarian or development aid, espoused different sharing dynamics from those that originated from within the community. Sharing practices affected development programs, which generally targeted resources to individual beneficiaries. Individual targeting and distribution conflicted with community sharing norms and expectations of fairness.

"Whenever any organization comes with aid, there is need to assemble [people]. People should be told to say, 'these are not your resources. If the government is giving these resources to share to people, do not cling to them. They are not your resources...Little by little you should share to everyone'" (Male respondent, Village 5).

External resources from aid were reported to be frequently redistributed by a local authority, typically the village chief. Villagers had opinions on how resources should be distributed - ideas which were influenced by their expectations of leadership. Equity concerns in the resource distribution process were also affected by the quantity of aid delivered. Even if the distribution process was perceived to be conducted fairly, households felt slighted, as resources were usually insufficient relative to need; *"The chief is impartial when distributing these items; the only problem is the sharing, whereby one goes home with too little which can't sustain households"* (Female respondent, Village 1). Jealousy over access to external resources, such as food or cash transfers, translated into mistrust of the chief. Chiefs acknowledged the resulting lack of trust affected their ability to govern and fairly distribute resources;

"In the past, it was very easy for me as a chief because a good section of the people would have some food so they would not cling to relief aid. However, this year, I feel the people are justified to claim a share because nearly everyone is hit with hunger crisis" (Chief, female, Village 1).

Leadership expectations and the role of the chief

Expectations of leadership influenced how villagers believed resources should be distributed or shared. The chief was considered to be the principal authority in community affairs. The chief also was said to determine critical issues such as land settlement, property rights and loans. The power of the chieftaincy was expressed through decision-making and enforcement, such as levying fines if rules were broken. Chiefs were expected to cultivate relationships with local officials such as the village Chairperson, Development Council (VDC), Group Village Head (GVH) and external organizations to mobilize development and emergency support. The chief was seen as the middleman between external organizations and the community. *"When organizations come to give aid...they need chiefs to be the mediators between the organizations and the people, because the leader knows the needy people"* (Chief, Village 3).

Villagers appreciated the capacity of chiefs to attract resources to the community, which in turn conveyed legitimacy for them to distribute said resources. The perception of the chief's role in bringing support persisted even in the case of programs that were assigned to communities without the chief's involvement. Chiefs thus possessed the power to summon external support, select recipients, and to distribute resources. Chiefs were also supposed to model good behavior and to uphold norms. Villager expectations of leadership were explored to better understand the chief's role in maintaining norms and resource distribution (Table 11)

Table 11. Relative importance of leadership characteristics (ordered by frequency of mention)

Characteristics	Illustrative quotations and respondent type	
1) Impartiality & fairness	"There should be no favoritism. All people should be given things equally. And even in terms of authority, a chief should be patient and one who understands. A chief should not take bribes. Constituents should give things to leaders willfully. The same way it happens at church" (Chief, Village 3)	"A good leader must not try to benefit alone from the aid that comes from the government. When there is registration for people to receive something, there should be fairness in the registration of beneficiaries." (Male, Village 5)
2) Mediating & communicating with officials	"[The chief] should be a medium of the people in the village in everything...Everything that is coming into the village firstly reaches the chief, and he is the one who informs the people of any development and even the coming of organizations." (Chief's wife, Village 6)	"For the things that come from the government, we expect to receive each time they come through him, on our own we can't know what has come without him...his household is where everything comes first." (Male, Village 3)
3) Community-orientation & kindness	"The chief comes up with ways and means so that we should not be suffering due to hunger in the village. Sometimes it fails but we know that he has the heart not to see us suffering." (Male, Village 4)	"The chief cannot do anything on his own without linking up with his people." (Chief, Village 4)
4) Distribution & sharing of aid	"He also needs to make sure that everyone gets a share of the relief items in the village no matter how few the items are." (Female, Village 4)	"A good leader will instruct his people to share things to their friends who also are poor when a program is there that supports the poor, so that many people of the village should benefit" (Female, Village 3)
5) Village development	"People expect me to take care of them and to report back to them about different development projects to be undertaken in the village." (Chief, Village 1)	"He is at the forefront of the developments, and he takes part...This he does regardless of his status as a chief, his friends sometimes tell him to be at home and let the people work, but he says being a chief is to take part in any activity to make sure the work is done well." (Male, Village 3)
6) Dispute resolution	"A good leader has a good character, able to unite parties in dispute, and also humble and calm." (Female, Village 6)	"A good leader should help his people when they are in trouble such as family disputes." (Female, Village 1)
7) Listening to complaints	"Our defense is always a chief or the key members in the family clan where we can run to and complain to" (Male, Village 5)	"He should also be able to listen to someone's problems..." (Male, Village 2)
8) Humility & hard work	"We should be able to compete with him because if he is lazy, we will also be lazy. But as hard work[ing] as he is, we will also work hard and follow his example" (Male, Village 5)	"He is supposed to be humble, because this makes it easy for people to listen to him, and also has to have good reputation." (Chief, Village 6)

Villagers reported that values of impartiality and fairness were highly esteemed, particularly in preventing favoritism in aid distribution. However, as indicated in several interviews, although favoritism was viewed negatively, supporting kin was considered socially acceptable and often inevitable. Kin networks were therefore crucial for resource-sharing. However, respondent views of

fairness occasionally clashed with kinship customs, which could also result in exclusion. Households reported specific cases of chiefs arbitrarily withholding benefits over family disputes. These conflicting opinions on the role of the chief mirrored tensions between communalism and paternalism.

“They [chiefs] are supposed to control, because a sheep cannot be without the shepherd. For you to take the sheep without directing them where to graze, they will easily get to other people’s fields and destroy [them]. So, he [village chief] is supposed to lead us so that we have right way and that we should be good people” (Male respondent, Village 3).

Gendered norms in resource allocation

Another important factor in the distribution and sharing of resources were gender norms and their effects on cultural practices, division of labor and other aspects of community life. Gender norms were reported to affect resource allocation processes in three ways: 1) decision-making around distribution, 2) access to resources, and 3) control over resources.

Women were said to be actively engaged in village activities, typically in local groups such as CBCC committees and VDCs. *“Yes, yes! Like the VDC here is the chairperson. Even at the ADC level, the chairperson is the woman from this village. Women are always in the committees”* (Village chief, male, Village 3). However, traditional village authority structures were overwhelmingly patriarchal. Most women in leadership had symbolic or administrative roles. Notably, there was one female chief in the study sample, but female chieftaincies on the whole were less common. Gender roles also determined which groups men or women participated in;

“Whenever we call for a meeting, there will be more women than men. Most men will send women and say, ‘go and listen for me, you will explain it to me later.’ It is like self-pride. Sometimes men don’t

think it's necessary to sit down and listen to some new things... maybe even political rallies...but most groups that men will be found [are in] beer drinking groups. In most cases even [with] the development activities, you will realize that when the chief calls for a meeting to discuss MASAF [aid program], men will come because there is money attached. But for the rest, they will say, 'women will tell us [at] home'" (Village Chief (male), Village 5)

The lesser representation of women in village leadership meant that women rarely identified themselves as a principal actor in determining resource distribution. Additionally, certain household types, particularly female-headed households, confronted challenges with obtaining resources through aid redistribution. Female-headed households generally believed they deserved aid due to greater vulnerability. However, all female-headed households in our sample complained of conflicts with leadership, with the exception of one household which was related to the chief. These disagreements resulted in harassment or even in exclusion from social programs or other benefits. One female head complained of exclusion from programs over a disagreement with the chief, who charged her a fine and forced her to move her household to another area. In another case, a conflict resulted in exclusion from the beneficiary list for cash for work and cash transfers.

"Sometimes chiefs can error but because they are chiefs then they cannot be opposed. So, we just stay silent at times. I fear that if I can oppose the chief I can be discriminated against in other things. So, I fear that...Things like income-generating public works program...people are listed for that and then am left out" (Female head, Village 3)

While these punishments could be administered by the chief to any household, female-headed households in particular were vulnerable as they had less access to power and social capital.

Further, the ability of chiefs to exclude or punish villagers if they expressed disagreement over decision-making forced many villagers into silence over perceived injustices.

"It happens that once the chief notices that you are critical of him he begins to sideline you in the village...Yet someone will be saying the truth, for example about distribution of resources, so that these resources should be fairly distributed. As a result, people become quiet - they don't criticize anything the chief says" (Male respondent, Village 1).

Additionally, respondents of both sexes reported the chief's clan was favored in distribution and that outsiders who joined the community through marriage had less access to resources. Men who were not native to the village and married into the community (*obweras*) were vocal about their subaltern status. One man believed he was deliberately denied relief aid because of outsider status but feared retribution from the chief; *"I am afraid that if I say something I will be chased from the village"* (Male respondent, Village 1). Interestingly, the wives of men not from the community did not criticize leadership as openly - possibly due to their own kinship ties in the village. This dynamic was likely affected by uxrilocal settlement common in matrilineal villages in Zomba, in which husbands settle in their wives' villages. Men who married into the community therefore had weaker kin bonds than others in the village. *"If organizations could distribute their aid directly to the beneficiaries without going through the chief there would not be the big foot...It is very hard being son-in-law in matrilineal society"* (Male respondent, Village 2). On the other hand, settlement practices were also said to also affect women who moved to their husband's villages. Respondents explained that if a woman settled in her husband's village, she could be pushed out of the community after a divorce or his death, through processes of social exclusion or pressure from her family to return to her home village.

Gender was viewed by respondents as a foreign and externally-imposed construct; “*Gender only exists because of the organizations that campaign and research that there should not be differences...However, nature differentiates works that can be done by a man and woman*” (Male respondent, Village 6). However, from respondent descriptions, the gender dynamics of resource control affected sharing practices. Men were responsible for providing resources for the household and determining the division of tasks. The kitchen was considered the women’s realm, as were decisions on food sharing. However, male respondents shared experiences that also belied women’s control over food resources.

"I also did not like to tell my wife to manage the flour...There are other men who put their fingers as a stamp in the flour. So that when they find that the fingers are not there, they should blame the wife to have been using the flour in their absence. Some even put a fly inside a basket and cover it. They put the fly so that when they come back, they can know whether or not the wife opened the flour basket and used the flour"
(Male respondent, Village 5).

Other respondents reported husband’s attempts to control their wives’ use of food, such as tying flour bags onto the roof beyond wives’ reach or placing grass inside food baskets to see if the grass had been moved. These practices allowed men control over food use and allocation even when they were not present in the household, and emphasized their authority over their wives.

“They [husbands] will instruct and say, ‘As I leave this place, let nobody cook here’...They will tell their wife to give a certain measure of food to their child. That is what we call controlling by oppression. Again, there are other chiefs, they exercise very oppressive kind of control that leaves you wondering whether this is happening [here] in this same country, Malawi” (Male respondent, Village 3).

Some wives found means to evade these restrictions and to share food regardless; *“I did not have the power because each time he refused, I was also afraid to take a particular thing in his presence...But if he refused, I would wait until he left the house and would then secretly give it out”* (Female respondent, Village 1).

Control over other types of resources appeared to be mixed, such as the agricultural inputs provided by the Fertilizer Input Subsidy Program (FISP). Some households reported joint control over fertilizer between wife and husband, while other households divided responsibility over the inputs. In the latter case, the male head of household purchased the inputs, as the 50-kilogram bags were considered too heavy for women, and because mothers had limited mobility due to childcare. In contrast with dual head households, female-headed households said they had fewer resources to share with others. That being said, female heads of household also reported greater freedom and autonomy in decision-making over resources because they did not contend with controlling behaviors by husbands.

Effects of resource type and origin on sharing practices

In addition to gender norms, sharing practices were affected by resource type and origin. Distinctions were described between internal (household) and external (development aid, Government support) resources and how each resource type was shared. Household resources were considered a product of personal labor and thus were associated with greater effort. Members expressed some reluctance to share these earned resources. However, the sharing of small, inexpensive items such as soap was not uncommon. Animal-source foods were highly valued but access to these foods were limited. Larger livestock such as goats were only slaughtered during celebrations, as there was an expectation that the meat must be shared among the community. The social pressure to share larger livestock was less true for smaller livestock such as chickens.

In contrast, respondents explained that resources that originated from external sources, including Government or NGOs were more likely to be shared. Recurrent humanitarian crises

brought large quantities of resources into the villages. In many cases, respondents revealed that chiefs generated social pressure for sharing of these external resources. However, the sharing of aid resources was not guaranteed to be equally dispensed. *"Everything that comes from NGOs is shared in the village but it is not everyone in the village who benefits"* (Female respondent, Village 4). Noncompliance with implicit or explicit sharing practices could result in exclusion from future distributions and other punishments by the chief.

Another issue that emerged was that rules and guidelines for program participation and targeting by NGOs and Government did not align with stated community norms. Organizations utilized targeting criteria to establish thresholds for poverty, determining inclusion in programs. However, poverty thresholds held no meaning within these communities, as all village members were considered poor. Community members showed awareness of program criteria for targeting. However, it was considered acceptable to skirt targeting criteria when they conflicted with local interpretations of poverty and sharing practices based on ideas of equity and fairness. *"The rules are set here [in the village]. Whenever you receive from organizations, they will tell you not to share these resources. But when you get here and see how people are suffering, you will begin to share"* (Female respondent, Village 5).

Targeting criteria were reinterpreted and reformulated by local chiefs, who possessed the power to control redistribution at the village level. Chiefs exercised this power through reallocation of development aid through assigned sharing, social pressure or by redirecting NGO-promoted community-based targeting processes. Some chiefs believed that they played an important role in ensuring equity through redistribution, and considered NGO targeting as counterproductive to community cohesion and mutual benefit.

"They [chiefs] want to divide everything...but the organizations that bring the aid tell us that whoever has been written is the right owner of the resources that we have distributed and discourage sharing. They

[NGOs] just want beneficiaries to think on their own on what to do. So, if they say that in front of someone with evil thoughts, do you think they will distribute to others? It's like the organization has given them ground' (Village Chief, male, Village 2).

Notably, the inclusion of households in redistribution processes directed by the chief was implicitly predicated on active participation in village development projects. These projects were promoted by the chief and often involved voluntary communal labor to construct or repair village infrastructure. The dynamic between communal labor and inclusion in distribution was not explained as a quid pro quo. Rather, supporting village development was viewed as a signaling mechanism of investment of individual resources to the common good.

The redistribution of resources within the village took several forms. A typology of distribution practices was developed from descriptions provided by community members; 1) Clan redistribution: program benefits were distributed at the clan level, with family clans subsequently distributing to their individual members; 2) Vulnerability criteria: specific groups in greater need were prioritized for distribution such as the elderly; 3) Equality concerns: resources were distributed to the greatest number of recipients; 4) Corruption. Other rationales for aid redistribution included charitable giving based on religious principles; *"If someone gives [to] you, God instructs us to give to those who give us"* (Female respondent, Village 2).

Although not the most prevalent practice on the list, corruption – particularly by chiefs - was based on allegations by respondents. Corrupt practices included diversion of resources to kin, siphoning off of program benefits and/or illicit sales of program resources. Diversion of resources from chiefs to their wives or prioritization of the chief's family in distribution was not uncommon. Yet many of these practices were tolerated, providing that resources remained for others in the village. Nonetheless, these practices still garnered complaints from the community;

"The problem is that the NGOs that bring relief aid trust the chiefs to register the beneficiaries yet the chiefs abuse the process by including many of their relatives. It would be better for these NGOs to just bring the aid and do the registration of the beneficiaries themselves - that is when many deserving people in the village will have a chance" (Male respondent, Village 1).

Overt cases of corruption, such as the theft of food aid or the resale of fertilizer coupons were more easily denounced by community members. However, the chief's social mandate and local political power ensured that cases were rarely reported. Resource redistribution was not perceived as unjust or inappropriate; rather it was a privilege afforded to the chief to make those determinations. Power imbalances between chiefs and villagers fostered patron-client bonds. This dynamic even encouraged patronage acts such as villagers gifting shares of program benefits to the chief to curry favor and ensure inclusion in future programs.

Development programs and norms

In the aftermath of the 2015-2016 humanitarian emergency, various development programs provided resources in the study area. Different types of development aid were treated distinctly depending on their physical and symbolic characteristics and their perceived value.

Resources with low social or monetary value were easily shared. In general, cash was said to be least commonly shared, as it was highly valued and fungible and more scarce than other resources. There was greater social pressure to share visible resources – for example, food, while cash was more easily concealed. While food aid had a high social value due to its immediate use and that it was less likely to be sold, it was also very commonly shared. Villagers reported that the 50-kilogram bags of maize from aid organizations were shared between as many as 4-6 families,

depending on quantities distributed and number of intended beneficiaries. Food sharing also played an important social role, as it was considered unacceptable to let kin go hungry.

“Some people when they just hear that we are going to receive, they know that that day they will eat. For me even after receiving there, sometimes I share some maize right there to some people who do not have food. I mill some flour and bring it home. As soon as I get home with the flour, I give out to some people who are in need as well. They actually come with their plates for a share” (Male respondent, Village 5).

Labor, in the form of work days, and the resulting remuneration from food for work (FFW) programs were also shared with others as a mechanism to distribute benefits.

Specific development programs active in the area were discussed by respondents in the context of how they functioned in the local context. Each program was described in relation with community sharing practices, according to the program’s design or to how it was perceived by beneficiaries and non-beneficiaries. The three principal programs described included two Government-run schemes - the Malawi Social Cash Transfer Program and the Fertilizer Input Subsidy Program - as well as the Nutrition Embedding Evaluation Program (NEEP), implemented by the NGO Save the Children.

The Malawi Social Cash Transfer Program (“*Mtukula Pakhomo*”, or the SCTP) was launched by the GoM in 2006. The SCTP is an unconditional cash transfer program targeting ultra-poor households with \$13 in monthly support. Program selection criteria included: food insecurity, lack of assets, undernourishment, and a lack of support from others in the form of cash, food, or gifts. Interviews revealed that the sharing of cash from the SCTP was widely perceived as a violation of program guidelines. Participants in the program believed that violations led to severe punishment. Sharing of SCTP cash was occasionally reported between members of a household or to close kin,

but recipients noted that sharing cash *outside* the household was uncommon. In contrast to the reaction of community members to the poverty-based targeting of other programs, the targeting of the SCTP appeared to have greater acceptance because the few households selected were visibly more vulnerable. However, in some cases, those households targeted by the SCTP were intentionally excluded from other programs by local chiefs. In several cases, chiefs deliberately excluded beneficiaries of the SCTP from other development programs, as overlapping support was considered unfair. These beliefs persisted despite efforts by development actors to sensitize communities and push the automatic inclusion of SCTP recipients into humanitarian aid programming due to the vulnerable status of the households.

Another program in the study communities was the Fertilizer Input Subsidy Program (FISP). FISP was developed in the 1990s to increase smallholder production through the provision of coupons for discounted agricultural inputs. Like food aid, FISP coupons were recounted to be the most widely shared of all resources originating from outside the community. Community members expressed awareness of the official program rules for beneficiary selection. Just the same, guidelines were ignored if villagers considered them unfair or against cultural practices of providing for others. Chiefs played an important role in deciding how FISP benefits were reallocated once they reached the village level. Leaders determined how benefits were shared through public processes whereby “official” FISP beneficiaries from GoM lists were paired with 2-4 non-recipient households. The chief also was said to administer punishment if official beneficiaries refused to share their benefits, including exclusion from future FISP distributions.

Finally, the last program examined by respondents was a community-based nutrition-sensitive agriculture program delivered through local preschools. The NEEP program model promoted voluntary contributions, stimulating resource-sharing through community in-kind contributions of food and labor to preschools and preschool committees. Preschools and households with preschool

children were provided with inputs, support and training on nutrition and agricultural techniques. Parents understood that contributions of household and preschool garden production, as well as volunteerism, to be necessary components of program participation. Preparation and provision of meals were maintained by social and community pressure as well as by perceived expectations of NGO staff. These activities built upon existing community practices while bolstering community nutrition knowledge to support preschool meal preparation.

"When the flour is finished we are all summoned as parents to the CBCC where we mix the maize and other legumes and process new flour and we leave the flour with our treasurer who keeps the flour. Then as parents we take turns to go to the CBCC and prepare the porridge for the children" (Female, female-headed household, Village 4).

The NEEP program approach contrasted with formal transfer programs that targeted the poorest households for transfers – a strategy that could have the greatest impact on worst-off households – but that often failed to achieve desired results due to poor targeting, elite capture or redistribution. A caveat for the NEEP program was that it was ambiguous if buy-in was sustainable for those households without children in preschool. Respondents mention reluctance by households without preschool-aged children to provide support. *"People do not contribute [to CBCCs] equally. Some people do not have kids. These [people] feel like they have no part as they do not have kids there. Since my kids are involved, I have to take a leading role"* (Male respondent, Village 6). That said, the program avoided the resentment and forced redistribution that occurred with other development programs by encouraging sharing and contributions and by targeting the whole community.

Discussion

"They [Government] realizes that in 'umunthu' [Ubuntu, spirit of oneness], the people help each other. It is that when you give items to those in need and others are left out, the problem is that when the time to do development work comes, those who did not receive...abscond from development works. So, it is helpful if the items are divided fairly to all people, then they feel counted and do all the works together."

Village Chief, Village 3.

These findings show that poor agricultural communities in Southern Malawi shared resources for social protection even during periods of scarcity. Sharing played an essential social function, preserving social and kin ties through reciprocal duties and obligations, and providing relational power to the vulnerable. Seminal literature on agrarian communities has documented a transition toward impersonal modern contracts and diminished paternalistic relationships with elites (Scott, 1977). Also, extreme scarcity has been found to disintegrate informal safety nets (Vaughan, 1987), with some affirming that food-sharing practices in Malawi are vanishing (Chisinga, 2005). However, these results show that a moral economy - an ethic of sharing and a responsibility to provide for the needy through mutual social support - persisted despite distorting forces of aid.

These results show that informal mutual assistance networks were a critical means to distribute resources, primarily through descent or physical proximity. At play were traditional and increasingly modernized support systems operating at the village level. Different groups and social protection arrangements (informal – such as family support; semi-formal – such as self-help groups; and formal – government programs) represented a continuum of reciprocity. Local networks acted as a pool of social capital in times of vulnerability, and access depended on the influence and connections of the household or individual to these networks. However, reciprocity networks may shrink due to necessity and limited assets when food insecurity increases (Longhurst, 1986).

Resources - whether labor, capital or in-kind transfers such as food - were shared, exchanged or borrowed. These “generalized reciprocal” exchanges do not occur through negotiated processes nor possess payback schedules (Hebo, 2013). These results show that resource characteristics affected sharing in this context: by origin (internal, external), type (fertilizer, cash, food), timing (season) and mediating agent (chiefs). Despite its important social role, this process of resource allocation is not guaranteed to be efficient or targeted to the poorest. Also, the relational dynamics of distribution risks further excluding the marginalized.

In this context, external support and community social protection systems exist in tension. In the villages studied, the distribution of external resources was a highly contested process, particularly during times of crises. Aid programs targeted individuals, defining who was deserving of aid and establishing singular ownership over resources. This individualistic approach clashed with expressed community ideals of collectivism. These results have consequences for programs addressing food insecurity and malnutrition. Sociocultural dynamics can facilitate program success or create obstacles to achieving outcomes. Understanding these dynamics aids in mapping food security resources and should inform contextually-appropriate program design and targeting.

Safety net and humanitarian aid programs are generally targeted to the most vulnerable households. However, it is a continuing challenge for interventions to reach these households. Decentralized targeting has been widely touted in development programs. Yet in the FISP, for example, this approach failed to reach the poorest. Wealthier, well-connected households had a higher probability of receipt and received more fertilizer coupons than poorer households (Kilic et al., 2015). The type of community-based targeting used in the FISP was particularly vulnerable to diversion to kin or redistribution. The targeting of social and development programs has an underappreciated social cost. Studies show poverty-based targeting reduces intra-communal reciprocity; weakening social ties (Devereux et al., 2017).

This study provides evidence that reciprocity and sharing of internal and external resources persist in the face of scarcity and of poverty-targeted aid. Community interdependence is based on the assumption all members are poor and deserving of aid (Chisinga, 2005). These cultural beliefs sustain sharing practices and lessen the effectiveness of individual targeting. Unsurprisingly, targeting in this context reveals significant errors of inclusion and exclusion: SCTP (Miller et al., 2008), MVAC (Gelli, Aberman, et al., 2017a) and FISP (Kilic et al., 2015). Redistribution of external aid was also a contested process. Aid diversion is rooted in clientelism, brokerage and efforts to operate independently of state authority (Sardan, 1999). Gift-giving norms and social obligations add to this dynamic, as do local rivalries and political reputation-building (Sardan, 1999). Dynamics of village life revolved around local leader's control over resource distribution. Resource inflows permitted opportunistic leaders to sustain or consolidate power. Leaders have political clout, cultural and moral authority as well as the power to reinforce inequalities between individuals or clans. This questions assumptions that community targeting ensures accuracy or fairness and problematizes transparency mechanisms to report fraud.

Specific development programs were examined in light of these findings on the sociocultural role of sharing practices. Sharing could have differing effects, in that program impacts could be diminished with reallocation and leakage. Conversely, more beneficiaries could be reached through sharing. In another paper on this project, it was found that sharing decreased the targeting efficiency of MVAC humanitarian food transfers (Gelli, Aberman, et al., 2017b). First, we found that sharing of the SCTP was not common, due to the fact that cash was rarely shared as well as community beliefs of the harshness of potential punishment. Other studies confirm that the sharing of the SCTP was rare (Strobbe & Miller, 2011). However, SCTP has been found to have other effects, some which mirror our results, such as crowding-out of private gifts (Strobbe & Miller, 2011) and conflict or jealousy by non-beneficiaries (Miller et al., 2008). It has also been found that goods

purchased with the cash may be more easily shared, such as with food bought with the transfer (Miller et al., 2008). This also aligns to our results showing that food is more easily shared than cash.

Secondly, we found that even though the FISP program targeted vulnerable households, control over the distribution process by local leaders caused resources to be redirected. Although the FISP has been touted as the “Malawi miracle” (Denning et al., 2009), evaluations have shown mixed results (Chibwana, 2010; Chirwa et al., 2011). Sharing practices displaced fertilizer purchase (Karamba & Winters, 2015) and resulted in diluted fertilizer amounts, which ultimately limited effectiveness. Poor and female-headed households have been found to be less likely to benefit from the program (Chibwana, 2010), and recipients often did not receive intended quantities (Holden & Lunduka, 2013). Control over FISP has also been found to help solidify and maintain “big man” power and status of village chiefs (Wroe, 2015).

In NEEP, the program aligned to existing sharing practices through a mutual gains approach. The program stimulated voluntary labor and in-kind contributions through community-level engagement. The program built on cultural traditions in which cash, food and other in-kind contributions were *de rigueur*. This village-level targeting through community input provision could help stanch “kinship taxation”, lessening social costs and resource diversions. This approach was found to be effective in improving child diets and nutritional outcomes in younger children despite minimal provision of external resources (Gelli, Margolies, Santacroce, Roschik, et al., 2017).

Finally, we investigated if certain groups were marginalized by village sharing practices. Gendered roles in this context are complicated as land tenure rests with women but men often direct decision-making and control resources. We found that female-headed households often encountered conflict with chiefs, leading to exclusion from benefits. The literature confirms that less connected households or individuals - such as female-headed households or *obweras* - are often excluded from sharing or distribution by leaders (Muiriri, 2013). Exclusion from social networks and

resource allocation has been found to impede the capacity of female farmers (Smucker & Wangui, 2016). Women possess fewer assets and receive fewer resources from kin as men - and with divorce common in matrilineal villages there is less family support for female-headed households (Bezner Kerr, 2005a). Female-headed households have lower food security and use less fertilizer (Uttaro, 2002). Their likelihood of food security is increased by factors such as increased size of social networks and improved resource access (Kassie et al., 2015). It is thus of critical importance to assess which groups are excluded from program benefits to avoid worsening social exclusion or gender inequities.

Although these patterns emerged from our data, they may not represent practices in all areas of Malawi, particularly where lineage traditions differ. Variation in governance quality could also affect how resource sharing occurs – poor leaders may co-opt resources or good leaders may equitably redistribute. National policy implications of sharing and the role of leaders in targeting in this context is further discussed in (Margolies et al., 2017). Transparent guidelines can improve community acceptance of criteria but do not supersede cultural rationales for fair distribution. If communities believe criteria are unjustified, alternate channels for redistribution are inevitably found.

Strengths and Limitations

This study had several strengths, such as the longitudinal case study design which allowed for in-depth follow up with the households and individuals over time. This approach enhanced trust between respondents and researchers, providing opportunities to gather sensitive information. One drawback was that qualitative data was not collected at the baseline of the parent study. However, households were revisited over two agricultural seasons during the intervention period. Another limitation is that respondents might have felt pressured to provide socially acceptable responses in regards to authorities such as village chiefs. In this case, enumerators ensured confidentiality and

respondents were able to freely discuss their opinions. Finally, it was not possible to interview other local authorities, which would have provided insights into other levels of leadership.

Conclusion

These findings show that informal support networks are critical to village life as well as to household food security. Development programs may disrupt the social fabric – but can better align to often overlooked issues of sociocultural dynamics and sharing practices (Kuzara, 2014). This also suggests the benefits of targeting that does not undercut cultural practices or promote social divisions. In addition, the role of gender in intended and unintended exclusion from benefits must be considered. These findings also provide insights to the interpretation of program impacts. For example, in the NEEP program, if child nutrition improved but household food security did not, this could be explained by CBCC contributions or depletion of household resources from sharing. One area for further investigation is to examine differing program effects in marginalized groups. For female-headed households, it would be useful to understand the balance between autonomous household decision-making with smaller social networks from which to gather resources.

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CHAPTER 5: The burdens of participation: A mixed methods study of the effects of a nutrition-sensitive agriculture program on female caregiver time use in Malawi

Abstract

Background: Development programs often rely on women's participation for the success of community-based interventions. However, women's time burdens are underestimated in both research and in program design. These programs assume women have time to contribute and do not adequately consider the opportunity costs of women's participation. Unpaid household labor, particularly, childcare, is often ignored. In Malawi, gendered attitudes about labor and household roles influence women's time allocation. Encouragement of women's volunteerism may add to the burdens of female caregivers. We tested this hypothesis on a participatory nutrition-sensitive agriculture program delivered through community-based preschools to examine whether the program increased women's care burdens, and whether the work was considered burdensome.

Methods: The mixed-methods study used a longitudinal quantitative dataset of female caregiver's time allocation over a 24-hour period and qualitative in-depth interviews over two agricultural seasons. The analysis was situated within an exploration of attitudes about gender and division of labor. **Results:** The program significantly increased caregiving time for participating women, however, this effect was only found during the lean season when preschool scale-up investments increased. The increase in the number of additional minutes of care was small and the voluntary work was not considered burdensome by participants. In fact, these voluntary contributions were viewed as qualitatively important to participants as an investment in their children's development.

Conclusion: These findings provide the first evidence on whether women's participation in a nutrition-sensitive agriculture program added to the burden of care. Although the program caused a modest increase in time spent in caregiving during the lean season by participating female caregivers, additional time was considered well spent and not burdensome. Evaluations of nutrition-sensitive agriculture programs should continue to track the gendered time investments of participation to avoid doing harm.

Introduction

Evidence from low and middle income countries shows that women have longer work days, contribute more to unpaid work and have less leisure time than men (Folbre, 2014; Stafford, 2011; Weerahewa & Lanka, 2015; Wodon & Beegle, 2006). Poor households that rely on women's labor fare poorly with such time constraints, leading to negative tradeoffs in food security and nutrition (Blackden & Wodon, 2006). Other factors affecting time allocation and work burdens include rurality, age (Leslie, 1989) and the time use of other household members (Weerahewa & Lanka, 2015). Unpaid care work - the domestic tasks of raising children or caring for other household members - contributes significantly to women's work burdens in Africa. The female work burden in Sub-Saharan countries has been found to be as much as 144% that of men's (Folbre, 2014).

In Malawi, a study found mean work hours per week for women were 10 hours longer than men, and this discrepancy increased to 11.6 hours in rural as compared to urban areas (Wodon & Beegle, 2006). Despite these evident disparities, the unpaid household economy is often excluded from labor productivity accounts. Women's "double workday" of care work in addition to agricultural labor is widely underestimated (Blackden & Wodon, 2006). Unpaid care work is affected by factors such as employment, number of children, marital status, age, as well as by characteristics that affect social standing such as caste and education (Budlender, 2010). Discrepancies in the amount of work women bear are exacerbated by social vulnerabilities that affect family structure. Female-headed households suffer a triple disadvantage: economic vulnerability, gender discrimination and a lack of family support (Buvinic & Gupta, 1997). The vulnerabilities of female-headed households amplify the negative effects of shocks (Campus & Giannelli, 2016).

Female caregivers in Malawi shoulder both agricultural and domestic tasks. Women in Malawi provide critical support to agriculture to ensure food security, including agricultural contract labor (Bezner Kerr, 2005b). Women also possess a heavier workload due to dual responsibilities

inside and outside of the home (Bezner Kerr, 2005a). The gendered dynamics of agricultural labor are also affected by seasonality (Fafchamps & Quisumbing, 1999; Tripp, 1982). Women in Malawi were also found to have less leisure time than their husbands, particularly during the dry season (Bezner Kerr, 2005a). A measure of women's empowerment, the Women's Empowerment in Agriculture Index (WEAI), covers five domains, including decisions about agricultural production, decision-making power over productive resources, control over income, leadership and time use. In the Malawi version of the WEAI, women had the second lowest relative achievement among all the empowerment domains in the domain of time use due to their heavy workloads (33.4%) (Westat, 2013). Despite the importance of agricultural labor to the welfare of subsistence households, increased agricultural work for women can negatively affect child nutrition through inadequate childcare or physically demanding working conditions that affect maternal nutrition status (Kadiyala et al., 2014). Further, women's access to agricultural inputs such as implements, machinery, fertilizers, credit, and improved seed is limited (Gondwe, 2018). Women have less access to agricultural extension services (Gondwe, 2018), which do not tailor to women's schedules or tasks (Blackden & Wodon, 2006).

Poor households are less able to consume or purchase services or goods to defray the time costs of poverty as are wealthier households. The concept of time poverty establishes limits on the amount of time spent in labor activities by an individual or household to quantify the burdens of work (Wodon & Beegle, 2006). Time poverty negatively affects food security and child nutrition as a consequence of the struggle to balance agricultural and care work. Notably, the critical period to address child malnutrition occurs when women are already heavily burdened with childcare (Blackden & Wodon, 2006). In poor households, devoting less time to caregiving negatively affects child nutrition, while wealthier households are able to avoid the detrimental effects of decreased caregiving time (Komatsu et al., 2015). For example, vulnerable female headed-households in

Malawi had a higher percentage of underweight children than dual head-households (Westat, 2013).

Time use surveys can help assess shifts in task allocation for women and men, and if changes in time allocation affect agency or choice (Walker et al., 2013). However, few studies of household time use incorporate domestic and non-market work despite their important role in welfare (Canavire-Bacarreza & Ospina, 2015). It is thus important to measure both economically productive as well as unpaid domestic time to understand the relative trade-offs of these activities (Doss, 2014).

One area of unpaid labor that is often overlooked is unpaid voluntary work, which is mostly shouldered by women (Elson, 2002). Volunteerism in self-help, religious, or other groups can increase women's time burdens. Likewise, voluntary participation in development programs could increase women's burdens, and questions remain of how agricultural programs affect women's time use (Kadiyala et al., 2014). Further assessment is needed of both the time costs and benefits of interventions to improve child health and nutrition (Leslie, 1989). Incorporating time use into program evaluations could avoid creating or exacerbating any existing gender disparities, potentially leading to improved outcomes (Blackden & Wodon, 2006).

This paper investigated whether a participatory nutrition-sensitive agriculture program channeled through community-based preschools in Malawi increased time spent in caregiving and how female caregivers perceived those voluntary contributions of time. The analysis was situated in an exploration of the attitudes about gender that shape household roles and perceptions of women's agricultural and domestic work. This paper first presents quantitative results on the impact of the program on women's time spent in caregiving. These results are followed by qualitative findings from men, women and adolescents on the role of cultural attitudes about gender and work. Finally, qualitative perspectives of women on the program's effects on time use are presented and quantitative and qualitative data strands are synthesized to draw conclusions.

The NEEP intervention

The Nutrition Embedding Evaluation Program (NEEP) was implemented by Save the Children in Zomba District, Southern Malawi. This nutrition-sensitive agriculture program was delivered through community-based childcare centers (CBCCs). NEEP was designed to improve child development and nutrition as well as household diets and production through an integrated approach. The agricultural component included agricultural trainings, provision of the seeds of nutritious foods, and chicken production. The nutrition component included nutrition and hygiene trainings and recipe demonstrations. Village Savings and Loan (VSL) groups were formed to provide capital for households and CBCCs. The NEEP program's participatory design relied on household and individual in-kind contributions of voluntary work and food or cash to support preschool meals. Voluntary work contributions included supporting CBCC construction and maintenance, meal preparation, gardening and caregiving of children in CBCCs. Some beneficiaries also participated in CBCC management committees. Further details of the NEEP intervention can be found in Gelli et al (Gelli & Roschnik, 2014). The cluster randomized control trial (RCT), NEEP-IE, was co-designed with the NEEP program in collaboration with Save the Children, Malawi. More information on the study design can be found in Gelli et al. (Gelli, Margolies, Santacroce, et al., 2017a).

Methods

Analytical strategy

The use of mixed methods is encouraged to identify patterns and explain social and gender dynamics to contextualize agricultural research (Behrman et al., 2014). This paper took a mixed-methods approach with a sequential explanatory design. Quantitative longitudinal data from the RCT was complemented by longitudinal qualitative data, which were concurrently collected at two periods.

Institutional Review Board (IRB) approval was obtained from the International Food Policy Research Institute (IFPRI) and Chancellor College, University of Malawi.

Quantitative data collection

Sample size

The quantitative component of this study originated from the parent study impact evaluation (NEEP-IE). Randomization for the NEEP-IE RCT was based on clusters identified by Save the Children. Sample size information from the actual randomization is presented in Table 12. Primary schools were used as the level of clustering and were stratified by Traditional Authority geographical areas. Fifteen clusters were selected at the primary school level and were assigned to each treatment arm for a total of 30 clusters. Within these clusters, 60 CBCCs were selected, with 30 CBCCs selected within each treatment arm. This allowed for 80% power to find a 0.24 standard deviation difference at 5% significance between arms in one the primary outcomes of the RCT, child diet diversity (Gelli, Margolies, Santacroce, et al., 2017b). Twenty households were randomly drawn from a census from each CBCC. The census identified households with preschool-aged children (3-5 years of age). The number of preschool children per household was estimated based on population-level information (mean=1.58 children per household) (Gelli & Roschnik, 2014).

Table 12. Sample Sizes after randomization for the NEEP-IE RCT

	Primary clusters	Communities / CBCCs	Households with children of target age	Children (0-5)	Children (3-5)	Girls (8-18)
Control	15	30	600	936	648	930
Intervention	15	30	600	936	648	930
Total	30	60	1200	1872	1296	1860

Note: Number of children estimated based on demographic data from DHS, 2010.

Source: NEEP Baseline Report, 2016 (Gelli et al., 2016)

Data collection

Baseline data were collected in October-November 2016. Households were revisited in March 2016 after 6 months of the intervention, and in October-November 2016 after 12 months of the program. A tablet-based household questionnaire was administered to the head of household and the time allocation module was administered to the primary female caregiver. Recall data for time use were collected from female caregivers in chronological order of the day prior to the survey, beginning with 4 a.m. of the previous day through 4 a.m. of the current day. Enumerators recorded a 24-hour log of activities. Activities were verbally defined by respondents and enumerators recorded the length of activities by 15-minute increments. Primary activities were first logged. If respondents had difficulty remembering, they were asked to broadly discuss activities conducted in the prior day and then activities were assigned to time periods during the day. Activity lists were generated a priori and revised with enumerator feedback to incorporate locally-relevant activities. Activities specific to the intervention were intentionally included. Other activities not included in the a priori list that were mentioned by respondents were recategorized into extant categories when appropriate. A table of activities that composed each category is shown in Table 1 (Appendix). Enumerators also questioned if a simultaneous activity was conducted during that period. These secondary activities – conducted at the same time as the primary activity – were logged when reported. However, respondents were not required to log both primary and secondary activities. An additional enumerator check was included to ensure that enumerators inquired specifically about childcare or other caregiving activities. Further detail on survey data collection is found in Gelli et al. (Gelli, Margolies, Santacroce, et al., 2017b).

Qualitative data collection

Sample description

Qualitative purposive sampling was utilized to select a sub-sample from the NEEP-IE households. A maximum variation approach ensured that households differed on food security status as well as on key demographic characteristics. Six villages were identified from CBCC clusters and three villages were selected from each treatment arm. Three households were selected per village for a total of 18 households. In each village, household types included male-headed households with dual caregivers; female-headed households; households with female adolescents and polygamous households. Household Food Insecurity Access Scale (HFIAS) scores from the NEEP-IE baseline survey was used to stratify households by low, medium and high food security. In each village, one household in each category was selected to capture differences in food security status. Further details are found in (Margolies, 2018).

Data collection

Household case studies were conducted through semi-structured in-depth interviews (IDIs) with male and female heads of household and spouses at two time points. Qualitative data were collected concurrently with quantitative surveys. Separate qualitative and quantitative teams were dispatched for data collection in the survey areas. Data were first collected during the lean season (March 2016) and secondly in the beginning of planting season (October 2016). Female adolescents were also interviewed to capture any shifts in intra-household labor. IDIs probed perspectives on female caregivers' workload, time allocation and stress. Interviews also explored men and women's culturally-defined ideas of work, time allocation preferences and the seasonality of time burdens. Additional questions focused on NEEP activities for respondents in the treatment group. These questions explored respondent's experiences with program activities in the household and in

community voluntary work. Inquiries explored the social value of these tasks as well as any challenges faced by participants, including which tasks were most time-consuming.

Quantitative analysis

A longitudinal analysis of household data was conducted over the three time periods beginning in the fall of 2016: a baseline survey, a midline survey at 6 months and at one year of program implementation. The primary hypothesis was to determine if time spent in caregiving increased over the intervention, and whether time spent in caregiving differed by treatment arm. A secondary analysis measured shifts in time use in other activities across treatment groups and time. The primary and secondary analyses used quantitative data collected from female caregivers only, including female heads of households.

The primary outcome was reported minutes spent caregiving in primary or secondary household care work and CBCC activities such as playing with children or preparing school meals. A longitudinal binomial regression model was used to estimate the average minutes spent caregiving at baseline and then separately for each treatment group at 6-months and 1-year post randomization. The binomial regression model was selected due to the bounded nature of the primary outcome, i.e. reported number of minutes spent caregiving during a 24-hour period ranging from 0 to 1440 minutes. This allowed us to define both the reported number of minutes spent in caregiving and the binomial denominator of 1440 minutes. The binomial regression model included an intercept, main terms for time (two indicator variables for 6-month and 1-year follow-ups), and the interaction between the main terms for time and treatment. Note that the model did not include a main term for treatment, as the households were randomized after the baseline assessment was conducted. A robust variance estimator (Huber/White) accounted for the correlation of household responses over time (Wooldridge, 2002). Secondly, an exploratory analysis was conducted to examine shifts in the distribution of all activity categories by treatment group and time period. The binomial model

described above was expanded by allowing the outcome to be defined as the reported number of minutes indexed by activity type, time and treatment group. The binomial regression model included an intercept, main terms for activity type (indicator variables for 15 of the 16 activities), main terms for time, and several interactions: interaction of time and activity, interaction of time and treatment, and a three-way interaction of time, activity and treatment.

Qualitative Analysis

Translations were conducted from Chichewa to English. A priori deductive thematic coding was conducted using NVivo qualitative software. Framework matrices in Microsoft Excel were used for analysis (Ritchie & Spencer, 2002), with separate matrices for each round of data collection. The framework approach is a method of qualitative analysis that maps data onto a matrix to aid in the identification of trends across thematic categories. Matrix categories were based on thematic nodes used in Nvivo coding. Additional codes were added with emergent themes in the data. The framework approach permitted analysis by hierarchical groupings across household type, village, treatment and respondent sex. Once analysis was separately completed for each matrix for each round of qualitative data collection, notes were transcribed by category and hierarchical grouping. Comparisons were made between analyses for the two periods and synthesis was conducted.

Analytical mixing

The quantitative analysis tracked shifts in time use whereas the qualitative data utilized a code list that paralleled themes from the quantitative survey. Analysis of the combined data strands was conducted by exploring the interrelationship of qualitative nodes to quantitative trends.

Results

Quantitative results

As this study focuses on female caregivers, descriptive analyses are confined to these respondents and their households (Table 13). On average, respondents were 32.2 years old, 84%

Christian and monogamously married in a household of 5.3 members. Female-headed households composed approximately 30% of the sample. Although mean hectares cultivated differed across the treatment arms (treatment: mean 0.64, SD 0.41, $p < 0.001$ vs. control: 0.55, 0.37), the difference was not qualitatively large.

Table 13. Household characteristics by treatment status at baseline, 2015

Characteristic	Overall		Control		Treatment	
	Obs(<i>n</i>)		Obs(<i>n</i>)		Obs(<i>n</i>)	
Age (years) – mean \pm SD	1168	32.2 (9.25)	582	32.12 (9.09)	586	32.38 (9.42)
Female head of household - %	1168	26.8	582	28.4	586	25.3
Household size – mean \pm SD	1168	5.34 (1.80)	582	5.33 (1.67)	586	5.35 (1.92)
Children in household (ratio)	1168	0.32	582	0.32	586	0.32
Dependency (ratio of children to adults)	1168	1.58	582	1.59	586	1.57
Hectares cultivated – mean \pm SD	1047	0.59 (0.39)	517	0.55 (0.37)	530	0.64 (0.4)***
Marital status - %	1168		582		586	
Unknown		1.3		1.9		0.7
Married, monogamous		74		71.3		76.6
Married, polygamous		1.8		2.2		1.4
Separated		5.4		6		4.8
Divorced		12.9		13.7		12.1
Widow		4.6		4.8		4.4
Religion practiced - %	1168		582		586	
Traditional		0.2		0.2		0.2
Christianity		84		85.6		82.4
Islam		15.5		14.3		16.7
Other		0.3		0.2		0.5
Highest education attended - %	1166		582		584	
No education		11		11		11
ECD		0.1		0.2		0.0
Standard 1-4		26.3		23.9		28.8
Standard 5-8		50.3		52.2		48.3
Form 1-2		8.1		7.7		8.4
Form 3-4		3.8		4.3		3.3
Adult literacy		0.4		0.5		0.3
Training college		0.1		0.2		0.0

ECD: Early Childhood Development.

* $p < .05$, ** $p < .01$, *** $p < .001$ for difference between Treatment groups (Pearson's chi-square, Fisher's exact test, *t*-test for independent samples, as appropriate)

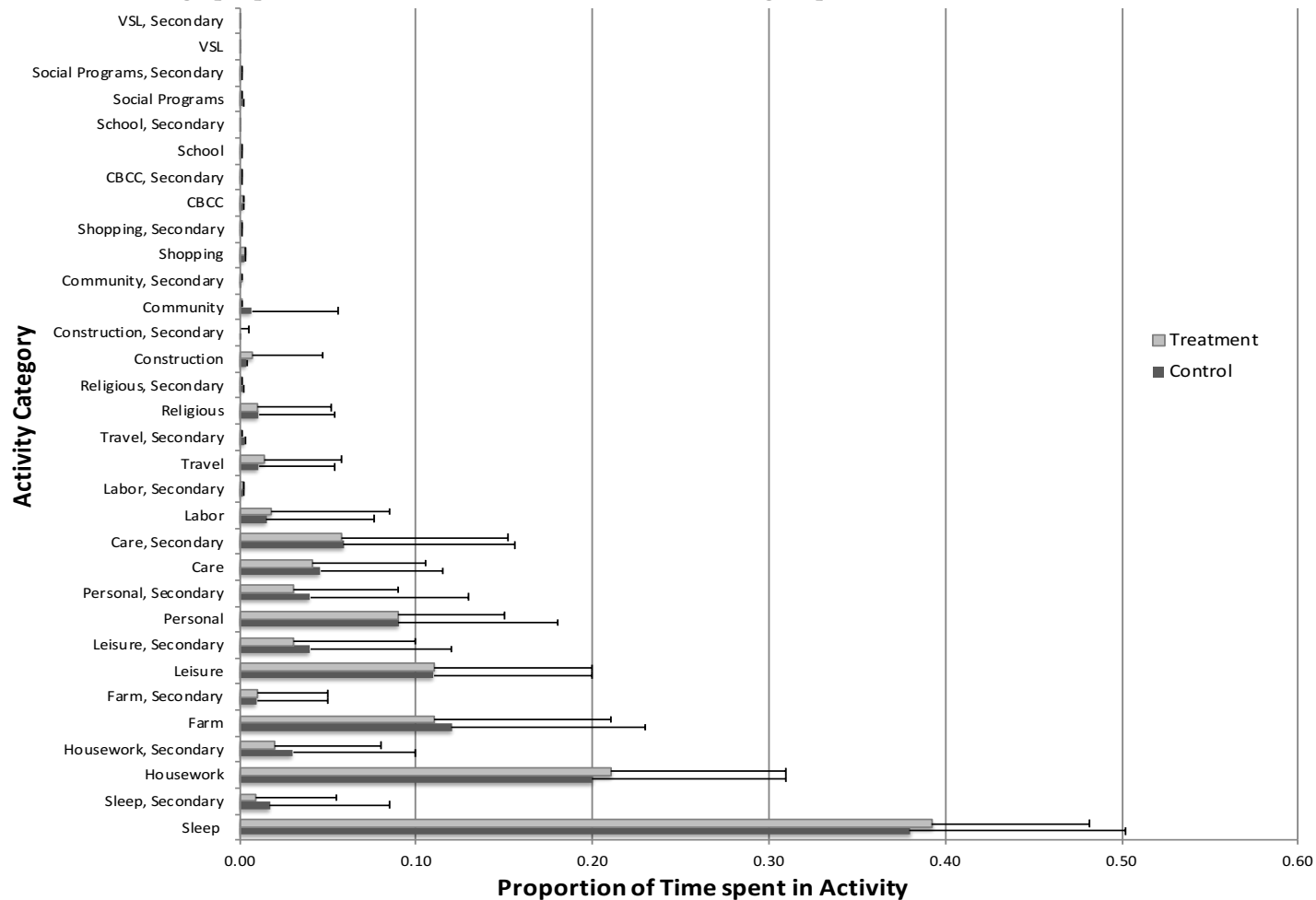
Table 14. Time allocation at baseline, proportion of time allocated to each activity

Activity type (n=16)	% Time spent
Sleep	39%
Housework	20%
Farming	11%
Leisure	11%
Personal	9%
Care	4%
Labor	2%
Travel	1%
Religious	1%
Construction	1%
School	>1%
Community	>1%
CBCC	>1%
Shopping	>1%
Social Program Activities	>1%
Village Savings & Loan	>1%

Table 14 displays the distribution of primary activities at baseline for the 1,168 female respondents to the survey. Female caregivers reported their time over the 24 hour period as primarily allocated to sleep (39%), housework (20%), farming (11%), leisure (11%) and personal activities (9%). Housework was the most time-consuming primary daytime activity, with caregivers spending on average nearly 5 hours conducting chores such as cleaning, washing and cooking. Farming occupied on average approximately 3 hours of women's time daily, and a similar amount of time was spent in leisure activities, such as socializing with family. Other activities, such as labor in own business, community activities, CBCC activities, Village Savings and Loans, social program activities, travel and religious activities took less than one hour of the day on average. There were no significant differences in time use by activity and treatment at baseline except for time spent in community activities, which was significantly greater ($p<0.01$) in the control group at 9.4 minutes (SD=70.16 minutes) as compared to 1.4 minutes (SD=20.14 minutes) in the treatment group.

Figure 13 depicts the average time use by treatment groups at baseline, showing both primary activities as well as secondary activities and shows there are no significant differences across groups. Activities composing <1 minute per day are not shown.

Figure 13. Average proportion of time use by activity, by treatment group at baseline (2015)



At baseline, mean primary time spent in caregiving was 62.5 minutes across both treatment groups. Two hours were spent in personal activities such as hygiene activities. Most significantly, the amount of time recorded as dedicated to caregiving was only 2 hours per day, inclusive of secondary caregiving. Notably, 39% of respondents did not record any time spent in caregiving at baseline. Excluding those that did not record any caregiving, mean time spent in care was 103 minutes (1hr 43

minutes). There were no differences at baseline in caregiving for female-headed households as compared to male-headed households, or by sex of household head by treatment group.

Table 15. Changes in proportion of caregiving time reported over time, all female caregivers

Time spent in Caregiving	Overall (%, CIs)	Relative change from baseline (p-value)
Baseline (%, SE)	10.5% (9.9, 11.2)	---
<u>Follow-up</u>		
Time 1 (6 months):	13.2% (12.5, 13.9)	+ 25.7%***
Time 2 (12 months):	6.4% (6.0, 6.8)	- 39.1%***

*p<0.05, **p<0.001, ***p<0.001

As seen in Table 15, ignoring treatment assignment, at baseline the proportion of caregiving time across the sample regardless of treatment assignment over the 24-hour period – inclusive of secondary caregiving and CBCC activities – was 10.5% (CI: 9.8, 11.1). Ignoring treatment, in the lean season (6-month assessment), the proportion of caregiving time increased to 13.2% (p<0.001), representing a relative increase of roughly 26% in the time spent caregiving. At end line, after 12 months, the proportion of caregiving declined to 6.4% (p<0.001) (Table 15), representing a relative reduction of 39% in time spent in caregiving.

Table 16. Program impacts on caregiving, over time, and treatment status

Time spent in caregiving	Overall (%, CI)	Control (%, CI)	Treatment (%, CI)	Relative change between Treatment arms from baseline (%, p-value)
Baseline	10.5% (9.9, 11.2)	--	--	--
Program follow-up				
Time 1 (6 months)	--	12.0% (11.1, 13.0)	14.3% (13.4, 15.4)	19.2%***
Time 2 (12 months)	--	6.2% (5.6, 6.7)	6.6% (6.0, 7.2)	6.5%

*p<0.05, **p<0.001, ***p<0.001

Then, program-related impacts on the proportion of time spent in caregiving were measured inclusive of primary and secondary care, and effects were partitioned by treatment status (Table 16).

The NEEP program increased the proportion of time spent in caregiving as compared to the control group. However, this increase only occurred at the 6-month time point, during the lean season, when the treatment group saw a statistically significant 19.2% relative increase ($p < 0.001$) in caregiving from baseline comparing treatment to control. There were no significant differences in caregiving between treatment arms at one year.

Secondly, shifts in time allocation were examined by treatment and time period for all 16 primary activity categories (Appendix Figures 1-16). In this secondary analysis, all categories were disaggregated including care and CBCC activities. This contrasts with the primary analysis, in which care and CBCC activities were grouped together in order to determine the effect of treatment on caregiving. This approach was taken as the program encouraged CBCC care activities, thus they were included in the outcome. In contrast, in the secondary exploratory analysis, the focus was on shifts in each activity category over time, so the care and CBCC categories were no longer grouped together. Thus, each activity type was included as a separate category in the secondary analysis.

The activities were grouped according to the average reported time allocated over 24 hours for each follow-up and treatment arm. For all activity categories, figures based on results can be found in the Appendix. Appendix Figures 1-2 show that within the treatment groups, the average time spent on caregiving and CBCC increased at the first follow-up compared to baseline, with the treated group having higher average time allocated compared to control. This mirrors results from the primary model. There was a seasonal increase in travel across both treatment arms during the lean season. The treatment group spent less time in religious and labor activities than the control group during the lean season, but these differences were small (< 15 minutes). There were few trends by treatment status, particularly as there were certain activities for which very little time was spent. The treatment group spent slightly more time in social program activities during the lean season (~ 5 minutes, possibly in other NEEP activities) than the control. For time in community activities, the

control invested slightly more time than treatment at baseline and the midpoint (~10 minutes). There were no seasonal trends in leisure, housework or personal activities. Between treatment arms, there was a small difference in leisure, with a small decline for the treatment relative to the control (~10 min) at end line. Expected seasonality was found in farming, with an increase in time spent during the lean season. At end line, the decrease in farming was more pronounced for the control group than for treatment, and the control had an additional 30-minute reduction. As for housework, the treatment arm saw a modest increase from baseline over the two periods. Finally, there was no seasonal trend with sleep. However, during the lean season the control slept slightly more (~20 minutes) than the treatment arm.

Qualitative Results

Household structure and gendered time use

Qualitative interviews explored the perspectives of men, women and female adolescents on time allocation within the household. Mapping patterns of household time use and intra-household task allocation situated the quantitative analysis of women's time spent in care work. Respondents described gendered patterns of task assignment. However, agricultural activities were contributed to by all: men, women and children. Women reported that when other household members returned from fieldwork, they conducted housework while men rested. Housework was defined as the domain of women and, unlike farming, the burden of chores did not vary by season.

To better understand the types of activities that were burdensome, interviews probed women's perspectives on their daily responsibilities. Women identified time-consuming tasks such as fetching water, cooking, weeding and planting. That said, respondents of both sexes described the physical exhaustion and stress of balancing farming with other tasks, *"When I have a lot of work to do and it all has to be done in one day...I get sick. My body hurts. I get worried in my heart. I can complain but if the task has to be done I have to do it. And the end result of forcing myself is getting sick"* (Female respondent,

Village 3). Women explained tradeoffs in time use and lamented the difficulty of running a business alongside caregiving duties. *"I don't do any business, I have no capital, and my duty is to raise the kids of the family...if I am to engage myself in business, then who is to be attending to the house? It is a bit difficult...if I am to be at the market every day for business, will the kids cook for themselves?"* (Female, Village 6).

An important result to emerge from these interviews was that time allocation appeared to be affected by household structure. Female heads of households reported caring for children all day, with exceptions only during school hours or when neighbors or family provided childcare. Female heads of household said they relied mostly on female adolescents to support caregiving, assist with *ganyu* – contract labor on other farms, and to support market activities. Shocks to household structure, such as the death of a nuclear family member, were noted to have resulting effects on female children who took on additional caregiving. Few female adolescents reported occasional school absenteeism due to increased housework. Female heads of household also reported struggling to balance work outside the household with childcare, lacking opportunities to conduct *ganyu* if pregnant. *"For those that are strong they do piece works [ganyu]. I am not that strong, I cannot manage to work on my garden and do piece works at the same time, otherwise it will be my garden that will suffer."* (Female head, Village 4). Childcare was said to limit investment in household production because of constraints to labor, *"I would say that the household activities have changed because that time even to do farming activities I was limited because I was pregnant, but as of now I think I have prepared my farm very well, and I am prepared to work extra harder in the coming period, the only thing that can hinder that is maybe hunger."* (Female head, Village 6). In contrast, dual-parent households reported they balanced labor demands by having one member do *ganyu* while the other spouse tended the household. Caregivers recounted an alleviation of care work while children were in the CBCC. In the sole polygamous household in the sample, task-sharing was reported between wives. The first and second wives alternated tasks, farming and cooking together. This task-sharing persisted despite animosity between wives.

Cultural attitudes towards work

Qualitative interviews further explored cultural attitudes and norms regarding the definition of work or labor. These themes were critical to understanding how women's labor is perceived in this context and why women's work could be undervalued or undercounted. Female respondents discussed how gender norms prevented men from supporting burdensome household chores. Men acknowledged there were chores they would not perform publicly. However, within the household men found it acceptable to perform tasks such as preparing children's meals. Men considered themselves to be authority figures and self-identified as the primary decision makers in household task allocation. However, female caregivers related that they assigned household chores to children. Female respondents deferred to husbands' authority to manage tasks outside traditional feminine domains; *"It's impossible because the man is the head of the house, so I can't go about telling him what to do...that's undermining him as a man...that's asking for a beating"* (Female respondent, Village 6).

Despite these cultural limitations to men's and women's roles in the household, there were some deviations from the norm. In one household, the husband managed housework while his wife participated in the Village Development Council. Other men admitted they were open to different roles in the household; *"This work despite the coming of 'gender' has its own side of the people who can do it better. I have noted that washing clothes and ironing has no [gender] side, everyone can do this. I have done this for a long time and I think I do a better job."* (Male respondent, Village 4). Male heads felt burdened by the responsibility to prevent hunger and guarantee income, *"I am the duty bearer of the house, all these people are looking up so that I can provide, so if I don't work, the children will not eat"* (Male respondent, Village 1); although many were cognizant of their partner's central role in the household, *"she is the owner of the family. I am the man but she is the one that takes care of my life and she also works on my tasks...and I say 'she is the 'man'"* (Male respondent, Village 5).

Gendered work dynamics affected the value respondents placed on different types of labor and the perceived intensity of different types of work. For example, both men and women considered male labor to be more physical. When asked about who had the most work, both sexes cited the male head. Respondents viewed “masculine” tasks – physical labor or those tied to income generation – as real “work”. Further, both men and women viewed women as possessing lesser physical strength. In some cases, men also diminished women’s mental fortitude. These views persisted despite the fact that women contributed significant time to highly physical agricultural and household tasks. *"He is the household head so he works so hard and also we have different strengths"* (Female respondent, Village 3); *"You cannot work with a woman from 6 to 4 o'clock in the evening. It seems she has weak blood...You cannot make her farm 24 hours. This war with problems is meant for men."* (Male respondent, Village 5). These gendered views also extended to children. Although girls conducted physical activities such as fetching firewood, respondents understood their work to be less intense; *"Boys work hard. So, boys and girls work differently"* (Female adolescent, Female Headed-household, Village 2). However, respondents of both sexes acknowledged that women bore both farming and housework burdens. They explained that women worked more consistently with less rest than men, and that they often cared for husbands in addition to their children. *"All the household chores are done by the woman, even for the husband to bathe, it is you - a woman - you need to boil the water"* (Female respondent, Village 6). Finally, despite reporting physical and mental exhaustion from work, both sexes believed taking significant leisure time was unacceptable or lazy. These attitudes reflect a strong cultural work ethic and reveal the stresses of subsistence farming. *"I don't like more resting time, even thirty minutes is enough...the body gets lazy. So I want to rest for just a short time."* (Female respondent, Village 4).

Seasonal changes in time use

In addition to exploring how household roles, structure and cultural attitudes affected time use, interviews examined the seasonality of time allocation. As this intervention supported agrarian

households, seasonal differences in agriculture and agricultural labor critical to the analysis. Seasonal differences in time use were defined by the agricultural calendar in Malawi (Appendix, Figures 17-18). Qualitative interviews revealed that the period respondents described as most busy was the lean season from December through March. The seasonal routines of agrarian households were defined by the weather and temperature. The lean period was characterized by preparing fields for planting, conducting contract labor and food shortage. Respondents reported the period from December to February was labor intensive due to garden work, with tasks somewhat reduced in March.

Secondly, interviews investigated household routines to provide insight to quantitative results on time use. Interviews revealed daily tasks and time use were similar across households and villages. Activities reflected the labor demands of household food production. Respondents considered farming to be the most time-consuming activity, although women identified childcare, fetching water and cooking as burdensome tasks. Respondents often multi-tasked while resting. For example, respondents stated while resting they made handicrafts and took care of children. This secondary caregiving was described as watching children while resting, doing light housework or socializing.

The lean season was characterized by the need to conduct *ganyu*, or contract agricultural labor to earn income to purchase food. However, respondents noted the pressure to simultaneously maintain household farms. *"During the lean season we are always under pressure due to the piece works [ganyu] that add upon the already existing work we have such as doing household chores."* (Female respondent, Village 1).

Respondents reported stress because of conducting chores, farming or gardening in addition to *ganyu*. *"During a hunger period you don't rest because you work to feed the children"* (Male respondent, Village 3). On the other hand, respondents found it difficult to farm during the lean season because they were hungry and unable to work for extended periods of time. *"During the lean season people will be weeding their crops in the field and so if you haven't eaten it becomes difficult for you to wake up in the morning and work. Sometimes you don't even go to the maize garden due to hunger"* (Male respondent, Village 4).

The study baseline and end line both occurred beginning in the month of October in 2015 and 2016. This period fell prior to the beginning of the lean season. The study midline, after 6 months of the intervention, was conducted at the end of the lean season in March 2016.

NEEP program participation

Finally, qualitative interviews addressed the NEEP program and respondent perceptions of the tasks and time investments of program participation. The NEEP program encouraged household labor and in-kind contributions to CBCCs, while promoting household production and consumption of nutritious foods. These program elements, in turn, had potential effects on the time use of participants in activities primarily related to: 1) Agriculture; 2) Meal preparation; 3) CBCCs.

NEEP provided training on agricultural techniques to increase yields and for the planting of nutritious crops. Respondents acknowledged that some methods – such as planting one seed per station, measuring spacing and doubling ridges - took more time than prior agricultural practices. However, participants acknowledged the differences in time were small. *“Maybe planting [this way] for three days. [In the past] in one day we could finish...But we did not complain because they said we would harvest more in a small plot of land”* (Female respondent, Village 1). Generally, participants felt that small increases in labor were worth the potential increase in yield, and that newly acquired skills were useful. *“I usually just pause my daily tasks whenever the NEEP tasks come up and I do enjoy doing these tasks in my heart.”* (Male respondent, Village 1)

Respondents generally did not attribute additional time burdens with the nutrition knowledge and training program components. Primarily, households who learned new recipes tested them at home but did not note extra tasks or time invested in these activities. For example, one household reported milling legumes to add to porridge, but detailed that the new practice did not require an additional trip to the mill.

Participants also engaged in CBCC activities. These activities involved a variety of tasks from start-up to regular maintenance. During the lean season, communities reported pooling resources to make bricks for constructing CBCC buildings with a kitchen and outhouse. More regular upkeep included gardening in the school plot, cooking school meals and cleaning. Women reported that preparing school meals was easy, and they enjoyed learning new recipes with nutritious foods. *"It's easy to prepare food for the children, you know I know a lot of things that I have learnt at the CBCC. Like Pawpaw, apart from eating the ripen one we can make chips from that...we learn a lot of things."* (Female respondent, Village 4). Notably, most volunteer support aside from construction was provided by women. Volunteers said that a self-organized community schedule helped to divide this work. This community schedule had a weekly rotation. Each woman with a child in the CBCC provided a weekly contribution from 7- 9 a.m. or 9-11 a.m. for either cooking and caregiving. According to participants, the rotation of responsibilities lightened the workload. CBCC garden activities were conducted 1-2 times a week. These activities, which were also rotated by group, included planting, ploughing, weeding and harvesting. *"Working in a group is not too much work, and since it is a lot of people we finish in a short time. It is not like in your own farm - before you know it you are done...I think we can make them [NEEP tasks] lighter if we increased the participation so that in an hour we could cover do a lot of work"* (Male respondent, Village 4). Program participants reported that gardens did not have labor-intensive crops, but acknowledged that tending school gardens in addition to those at home was more work and had to be managed carefully.

Those who participated in CBCC committees met occasionally, although some met more frequently — as much as once a week. In addition to the labor contributions from households, the program encouraged in-kind contributions to meals such as maize flour, peas, sugar, and in some cases, small amounts of cash to purchase food. The committee collected contributions from households except during the rainy season when food was not readily available. Although

respondents acknowledged workload increases due to CBCC-related activities, it was not overly burdensome. *“My routine is still the same as always. I go to the garden in the morning. And whether I go to that [CBCC] garden or my other garden it doesn’t matter they both are for my benefit”* (Female respondent, Village 6). Participants said they understood the activities contributed to their children’s development.

However, NEEP activities could have also potentially spilled over to other members of the household. Female adolescents recounted that they regularly helped with housework, farming and small business and notably, with childcare. Adolescents said that during the farming season they had little time for homework and often arrived late to school. Some female adolescents reported modest increases in chores or housework because of the mother conducting NEEP activities. However, NEEP tasks were not reported to affect time farming by female adolescents.

Synthesis of Results

Seasonal differences were found in caregiving across both treatment groups. Overall, total reported caregiving, quantified in minutes spent in care time over a 24-hour period, increased in the lean season and decreased in the beginning of the planting season. Qualitative results revealed that the lean season was perceived to be a busier time for many households, due to the need to conduct ganyu in addition to maintaining gardens and seeking alternate means to source food.

It was identified that the NEEP program significantly increased time spent caregiving by female participants, but only during the lean season. However, the size of this increase was modest and participants did not view the increase to be qualitatively important to their time burdens. No treatment effects were found for other activities that could have been affected by the program, such as household production and housework for nutritious meal preparation. Qualitative data revealed that the community developed schedules ensure a rotation of volunteers. Each caregiver was allocated 1 day per week at CBCC for several hours, which lightened the work burden for each

participant. Ultimately, time contributed to CBCCs was viewed as a positive development for early childhood development.

One question that emerged from this research is why there was a significant increase in reported caregiving across all respondents during the lean season. One possible explanation is due to a distinction between “passive” caregiving, defined in the literature as not requiring the full attention of the caregiver, such as when a child is napping but the caregiver is in the home, and active caregiving, such as breastfeeding. Both active and passive caregiving has been found to be widely underreported in this context, with passive care more likely to be classified as a secondary activity (Lentz et al., 2018). As secondary activities were not reported by many respondents, it is likely more passive care was not recorded. Another reason passive care is overlooked is that as it is culturally invisible in the setting, in which caregiving is so routine and not perceived as labor, respondents may not report it. Our qualitative results show that households reported more stress in balancing activities such as ganyu with household tasks during the lean season than in the post-harvest period. It is possible that female caregivers were more likely to report caregiving when busy and actively caring for children and managing several other activities. Thus, at end line, when caregivers said they were less burdened, they may have spent more time passively minding children, such as while spending time with family or neighbors. However, this conclusion cannot be definitively reached – rather it indicates a promising area for future study.

Examining the quantitative trends by treatment, respondents in the program reported devoting more time to caregiving than the control group, but only during the lean season. The increase in caregiving in the treatment group was influenced by increased time spent in CBCC-related activities. Time caregiving was affected by an increase in time dedicated to CBCCs, which included caregiving of preschool children, cooking, maintenance, cleaning and CBCC committee participation. Households described managing the extra work without major changes to their schedules. This

additional time contributed to CBCCs was expected, as the program required voluntary time contributions to CBCC-related activities. This occurred when households were supporting CBCCs as the program continued to be scaled up. This was mirrored by qualitative reports from men, who also reported contributing extra labor during this period on CBCC construction and upkeep. The parent study found NEEP modestly increased the likelihood of CBCC meal provision and regular function (Gelli, Margolies, et al., 2018). Quantitative increases in care time were considered to not be qualitatively important, but programs like NEEP should still be attentive to the potential negative externalities of encouraging volunteer labor in poor communities. Time for program participation should continue to be tracked and measured to avoid negative effects on households. In particular, attention should be paid to how programs rely on traditional gender roles or could potentially exacerbate gender inequities.

In the exploratory analysis, seasonal shifts across non-care activities were not observed by treatment groups other than small increases in housework and farming. These modest increases are possibly the result of program inputs and encouragement to increase household production of nutritious foods and for preparation of nutritious recipes in the home. However, further investigation is needed here to assess these seasonal differences. Regardless, it emerged from both data strands that households were vulnerable and overburdened during the lean season.

The treatment effect on caregiving and on CBCC time was not present at end line. Qualitative data gave insights into program implementation and perspectives of participants. Extra time for program activities did not obstruct regular household function or significantly overburden caregivers, in their opinions. In fact, participants felt their time contributions were valuable as they contributed to their children's development. However, it can also not be ruled out that treatment effect dissipated by end line due to declines in regular CBCC function. Seasonal trends in activities were noted in both the quantitative exploratory analysis as well as the qualitative data, such as lean

season dynamics of traveling to seek work, as well as modest increases in housework and farming in the treatment group during this period. The treatment group spent less time in labor activities than the control group during the lean season, although the differences were small (<15 minutes). It is possible the reduced labor activities by treatment arm was a result of lesser time invested in ganyu as the opportunity cost of supporting CBCC activities.

Discussion

Participatory development has long been promoted as a means of engaging poor communities in their own progress and as a means of avoiding top-down development solutions (Chambers, 1994). However, participation is situated in social context and is thus inherently political (White, 2010). Social difference is expressed through participation or non-participation, and work burdens may be passed on to lower status community members. The benefits of participation in development projects are assumed to outnumber any costs. However, the time and resource investments to participate in development programs are not equally available to all who participate, particularly women (Mayoux, 1995a). These approaches carry assumptions that participation increases empowerment through engagement in development activities. Nonetheless, programs often direct women's participation into traditional roles. Such programs assume women's capacities are underutilized rather than questioning whether they are overburdened. Women's voluntary work in participatory development projects raises concerns about additional time burdens of unpaid work. At the same time, women may value participation for its social value and non-economic support (Mayoux, 1995a). However, studies tend to overlook embedded social relations and community dynamics in exploring the negative externalities of women's unpaid work (Mccarthy, 2018).

On the other hand, inclusion of women in development projects has been found to improve female-directed or joint decision-making (Holvoet, 2005), and to expand their roles if participation increases their ability to engage in public debate. A study that modeled the inclusion of female

leaders and women in the membership of local organizations with data from Malawi found that such representation could improve agricultural productivity and welfare (Mccarthy & Kilic, 2015).

Women's participation has also been found to increase their influence in less feminized arenas such as forest conservation (Agarwal, 2009), or income earning potential. One example are income-generation projects promoted in the 1980's. These projects pushed feminized work such as handicrafts, ultimately failing to alter women's positions and gender roles (Mayoux, 1995b).

Development projects involving agriculture have unique characteristics that affect women's time. Women's time in agricultural labor varies by season, affecting their ability to provide childcare. Programs should therefore adapt to the seasonality of women's labor to better support caregiving (Madan et al., 2018). In a review of agricultural development projects, some were found to improve gendered barriers to participation. However, burdens associated with women's participation were rarely measured and improvements to women's outcomes did not guarantee improved inequality (Johnson et al., 2017). Agricultural projects that involved caring for livestock added to women's time burdens. In one program, women in the program spent more time on livestock activities than caregiving as compared to the control group (Johnson et al., 2016). However, the time burdens of nutrition-sensitive agriculture programs have not been measured.

Developing countries have gender inequities in unpaid care work. Studies have found negative correlations between income and gendered imbalances in unpaid care work (Ferrant et al., 2014). Our results show that female caregivers in subsistence agricultural villages in Malawi struggled with significant workloads composing a variety of tasks including farming, housework, care, contract labor, business and participation in community development. Gender dynamics affected time allocation and labor. These data also offer insight into the effects of the NEEP intervention model and the role of CBCCs in the program. It also provided a better understanding of when program activities occurred and how participation affected the time use of those receiving the program.

Gendered labor and cultural attitudes about time use and work affected program implementation. Broadly, the NEEP program relied on traditional gender roles for engagement in program activities, reinforcing existing gender dynamics. Men did not support CBCC care activities because they were seen as women's work. Men helped with the construction and improvement of preschool structures and occasionally were involved in committees. Greater male involvement in school gardens and committees could be actively encouraged to improve the gender balance in program participation and to lessen additional burdens on women. This conclusion is supported by recent research on early childhood development in Malawi. A recent study on improving the quality of care and stimulation in CBCCs found that caregiving was seen as a woman's domain. This study recommended that ECD programs support parents, and women in particular, without burdening them further. This required outreach to fathers, who generally expressed discomfort with providing or supporting childcare (Gladstone et al., 2018). Recognition of the burden of care, particularly on poor women, is a first step in working to reduce burdens with the goal to redistribute care work to also include men. Efforts to do so must carefully time trainings to avoid additional burdens and to sensitize men and women to sharing caregiving responsibilities (Elson, 2017). Further, organizations should be attentive to how seasonal dynamics could affect program implementation and differences in caregiver time use. It could be useful to provide additional support to bridge the lean season, when households balance labor pressures and have a lesser ability to provide in-kind donations.

Investigation of the voluntary contributions of other household members, including female adolescents and men, would further increase understanding of intra-households shifts in labor. This is relevant if participation burdens shift to other members or caregiver tasks are displaced to others. In order to do no harm, it is important to avoid labor substitution by female adolescents, particularly those in female-headed households to avoid school absenteeism. Also, female-headed households reported difficulty in maintaining concurrent livelihood strategies. They reported being more labor-

constrained and struggling to balance the burden of childcare with other work. A topic for further investigation is whether additional caregiving burdens female-headed households disproportionately.

Lastly, care work is still underestimated in settings such as Malawi due to a variety of cultural and methodological factors. Qualitative results confirmed that the quantitative measurement of caregiving is still grossly underestimated, even with additional survey prompts on care work. This phenomenon may occur in part due to cultural interpretations of the definition of work and unfamiliarity with the practice of precisely measuring or recalling time use.

These conclusions support calls for improved methods of measurement in time use studies, including raising awareness of women's unpaid and often invisible labor to both men and women (Lentz et al., 2018). Other approaches to measurement are being explored, such as the use of accelerometry to triangulate energy expenditure with time use and activity data (Zanello et al., 2017). Integrating qualitative data and household observations with quantitative measurement could improve validation. For example, pictorial activity categories, validated locally, could be incorporated into electronic surveys. This would lessen burdens for data collection and might improve activity identification and the accurate inclusion of care time, particularly if a prompt for the presence of a child occurred alongside every activity. Other methodological issues include ensuring that data collection methods are culturally appropriate or take cultural attitudes of work into account.

Strengths and Limitations

Recall bias could have occurred if individuals were unable to accurately remember activities conducted. However, 24-hours prior to a survey is a short recall period, and 24-hour recall modules have grown in acceptance and accuracy with the widely used American Time Use Survey (*American Time Use Survey User's Guide, 2003-2017*, 2018). Yet, respondents may not be accustomed to categorizing time into activities and short increments. In addition, the recall period may not represent typical time, such as if the recall period fell on a market versus a non-market day. Checks

were conducted to preclude significant differences by day of survey. Activity categories may have also been interpreted differently by respondents than by researchers. This challenge was addressed through enumerator training to properly explain categories. Additionally, respondents were able to include self-defined activities, which were then reclassified. Surveys also do not explain the meaning of time use to individuals. For example, leisure is not well captured because its meaning differs by context. Local ideas of work and leisure affect reporting and measurement, including whether childcare is considered work. The mixed methods approach addressed these limitations and strengthened the interpretation of quantitative results. Another limitation was that quantitative data were not collected for adolescents. Female adolescents in particular may shoulder excess housework or caregiving. We addressed this gap through qualitative interviews with female adolescents. Finally, although the longitudinal dataset tracked seasonal changes, it did not capture all seasonal variation. It would be useful to investigate differences during peak labor demand during harvest - when food is available but intensive work occurs. Finally, some activities coded as CBCC-related may not have been actual care work, but instead represented other CBCC activities such as cleaning or maintenance. As the concern of this paper relates to overburdening caregivers, other activities remain relevant. Finally, there is no reason one treatment group would report more caregiving. Thus, while caregiving was underestimated, it held as a comparison of difference between treatment arms.

Conclusion

To our knowledge, these findings provide the first evidence on whether women's participation in a nutrition-sensitive agriculture program added to the burden of care. The NEEP program significantly increased caregiving time for women in the program, but only during the lean season. However, quantitative increases in care were small and not considered burdensome by respondents. Further, contributions were viewed as qualitatively important to participants.

These results help to inform policy making. The Government of Malawi (GoM) intends to implement the NEEP model through the national system of CBCCs. It would be beneficial to further investigate the function of CBCC committees, as they play a key role in organizing volunteer time. Additionally, these results suggest the potential for the NEEP program to take a more proactive role by encouraging increased male involvement in CBCC function, including sharing of care burdens and greater engagement in nutrition trainings and meal preparation. Finally, there is ample room for methodological innovation in data collection for time use studies and for mapping the seasonal effects of programs. Methodological improvements can improve measurement, providing insights for improved effectiveness of social programs that do not overburden the communities they serve.

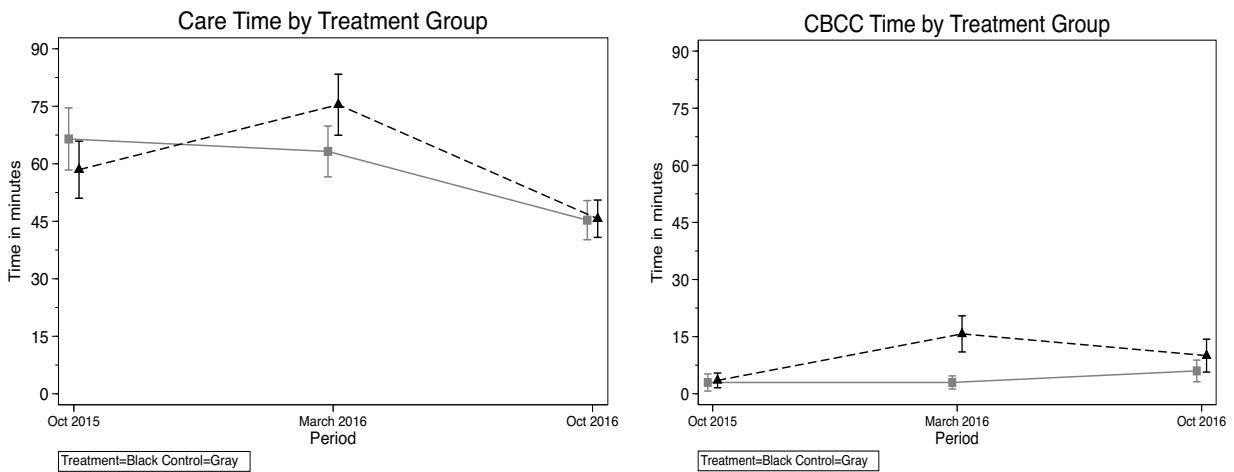
Appendix

Appendix Table 1. Activity Category Definitions

Care
All activities related to care for others in or outside of household, but particularly for children, including preparing baths and bathing, washing nappies, breastfeeding, cooking porridge, supervising or playing with children, accompanying child to school
Farm
All agricultural activities (wetland, garden or cropland) from planting to harvest; Protecting fields from pests and thieves; Care for livestock
Labor
Selling, marketing, processing food or food items (beer, fritters, tomatoes, etc.) for income; <i>Ganyu</i> (temporary agricultural labor); other employment and time spent seeking employment; Activities related to cash crop production (drying, smoking, sewing, grading of tobacco or other cash crops such as cotton)
Housework
All activities related to food processing, preparation and cooking (including milling maize); Cleaning (Sweeping, mopping, washing, moving utensils, furniture); Gathering or cutting firewood; Fetching water
Community
Cultural events and community gathering such as funerals, weddings, initiation ceremonies; Community development activities not related to CBCC
Religious
Attending church, mosque, religious services; praying; reading religious texts
Sleep
Sleeping and napping
Personal
Grooming and hygiene, healthcare, eating and drinking
Social Program
Registering/pickup/other activities related to non-NEEP social programs such as food aid, labor related to cash or food for work programs
Leisure
Resting, socializing, listening to radio, conjugal activities, visiting friends or relatives
CBCC
All activities related to CBCC, including participating in meal preparation, committees or teaching

Appendix Figures 1-16. Time in Activity Categories, by Treatment Group and Period

Figure 1-2. Time in care-related activities (Care and CBCC), by Treatment Group and Period



Figures 3-5. Activities with mean minutes <90 at each follow up, by Treatment Group and Period

Figure 2.

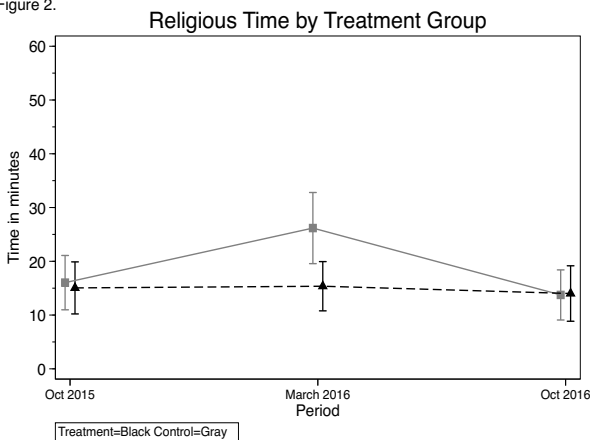


Figure 3.

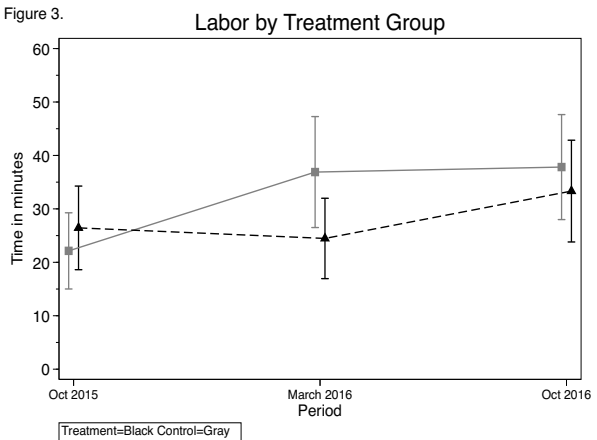
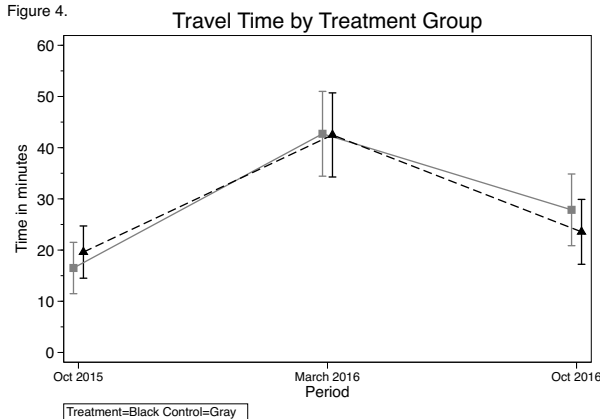


Figure 4.



Figures 6-11. Activities with mean minutes <30 at each follow up, by Treatment Group and Period

Figure 6.

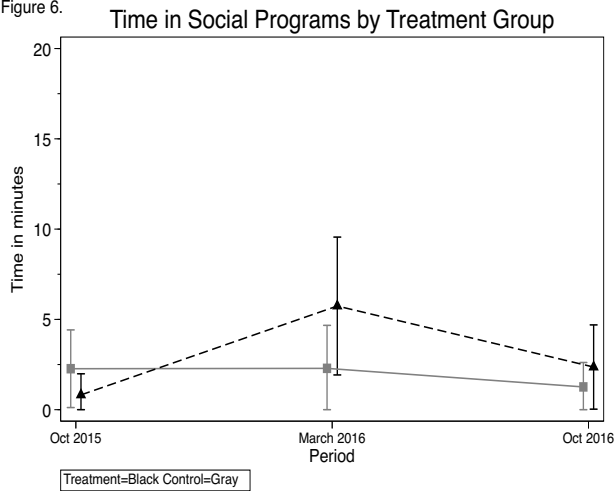


Figure 7.

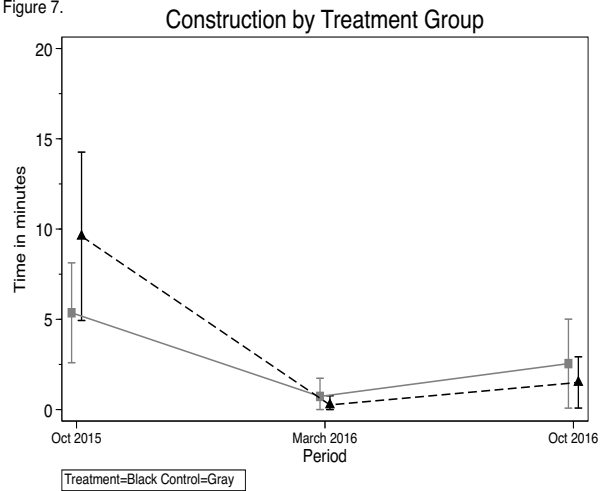


Figure 8.

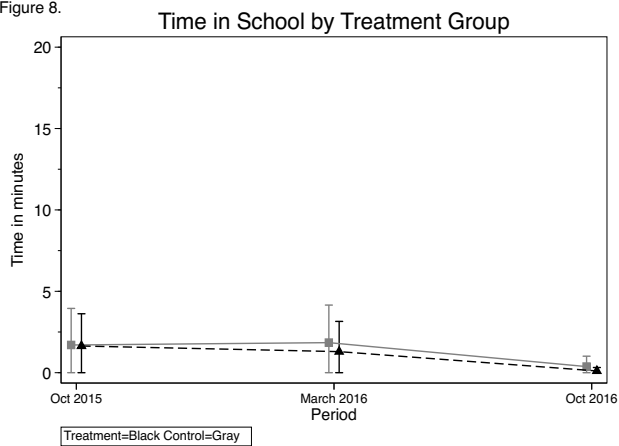


Figure 9.

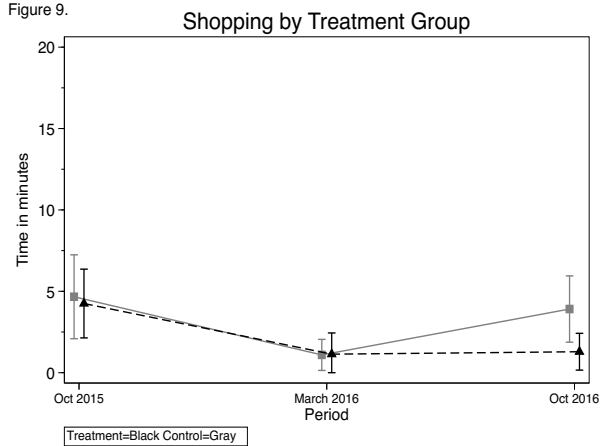


Figure 10.

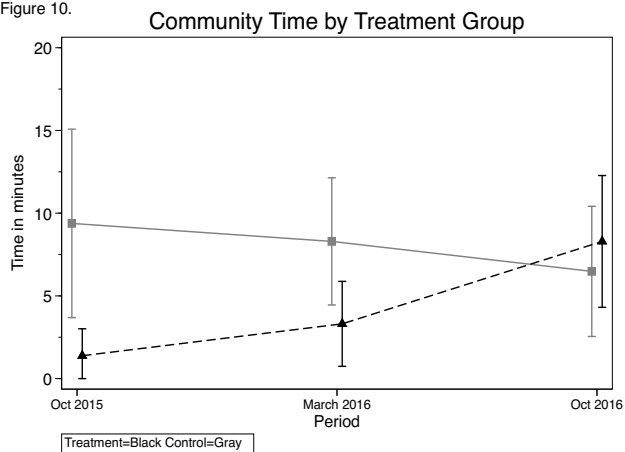
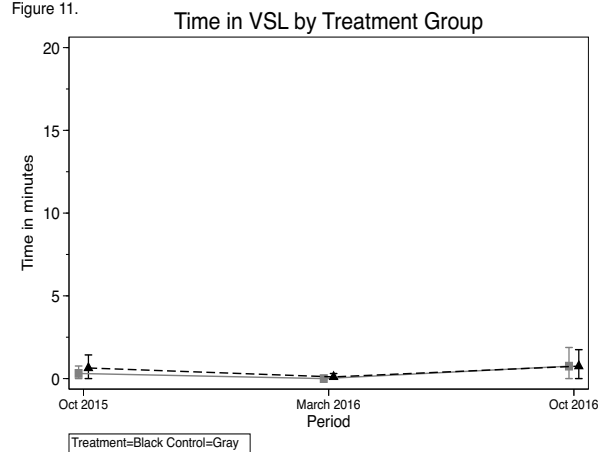


Figure 11.



Figures 12-15. Activities with mean minutes >90 <480 minutes at each follow up, by Treatment Group and Period

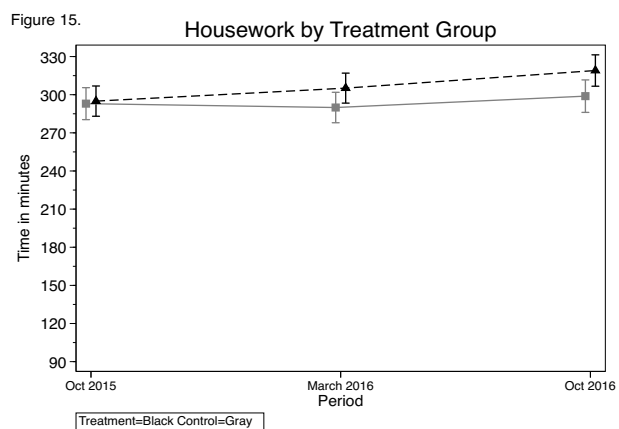
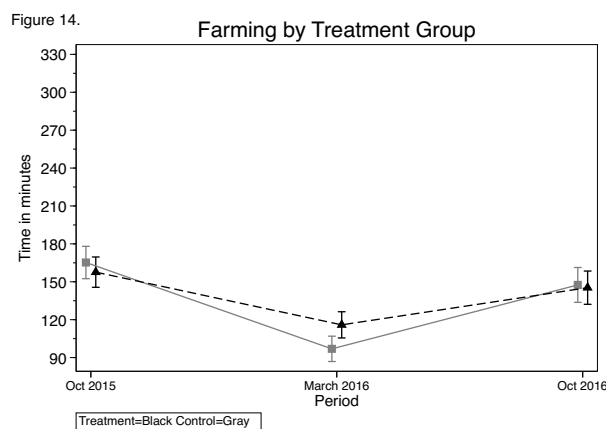
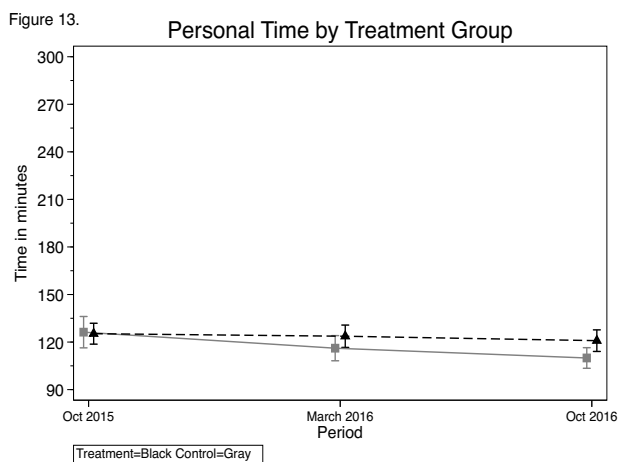
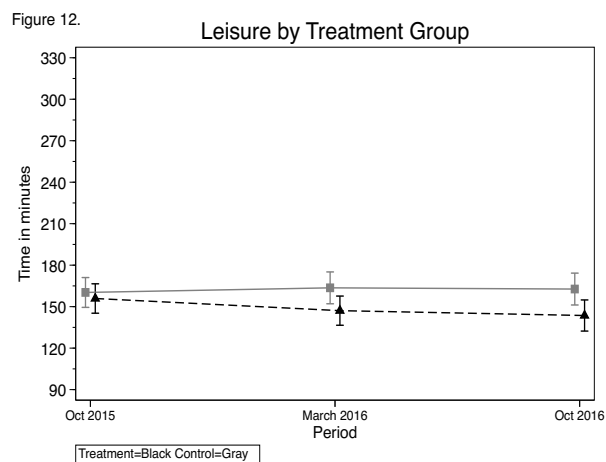
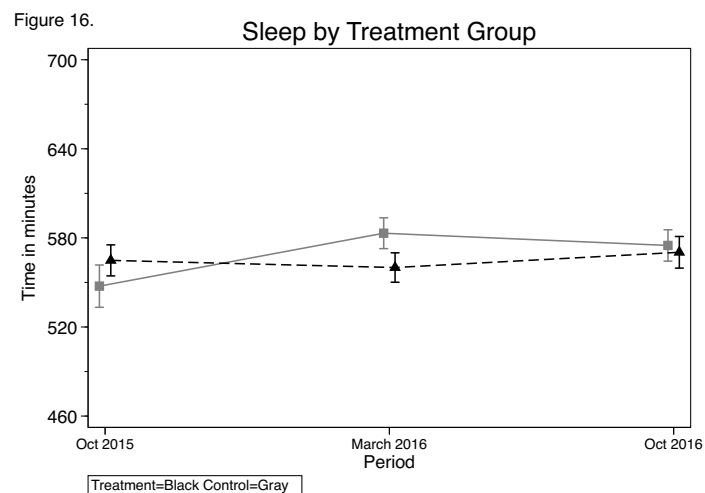
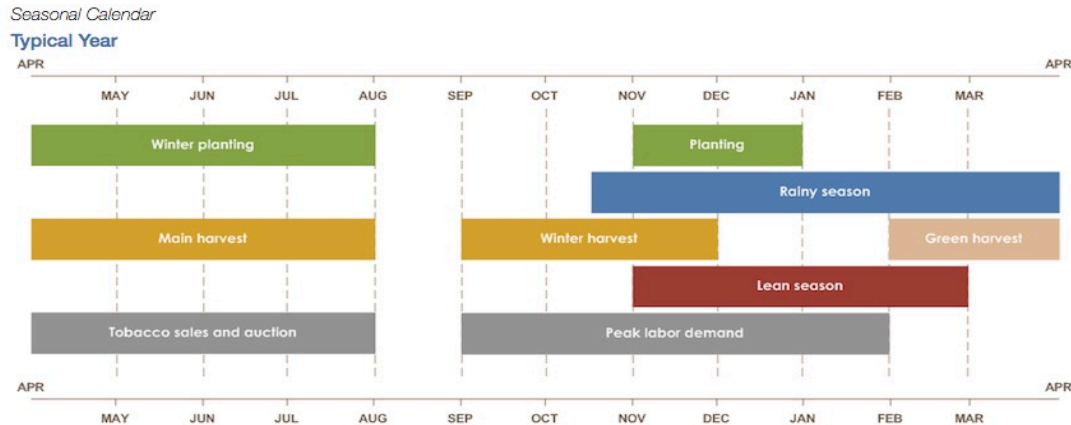


Figure 16. Activities with mean minutes >480 at each follow up, by Treatment Group and Period



Appendix Figure 17. Seasonal Calendar, Malawi (FewNet)



Appendix Figure 18. Seasonality in Cropping activities in Zomba (Kamanga, 2002)

Table 5.2. Seasonality in Cropping Activities, Zomba, Southern Malawi

Crops	June	July	August	September	October	November	December	January	February	March	April	May
Maize	Incorporation of residues (clearing)		Incorporation of residues and ridging		Ridging, planting, weeding (1) and fertilizing (1)			Weeding (2) and fertilizing (2)	Weedubg (2) and bunding	Harvesting		
Groundnut	Harvesting and clearing					Planting		Weeding				Harvesting
Pigeons peas		Harvesting				Planting and weeding		Weeding				
Cassava		Planting and ridging										
Sweet potatoes	Harvesting							Planting				
Mucuna						Planting at low population densities					Harvesting	
Chick peas						Planting						Harvesting
Beans						Planting					Harvesting	

Note: Dark shaded areas represent high labor intensity.

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CHAPTER 6: CONCLUSION

Nutrition-sensitive agriculture programs aim to address the underlying problems that cause malnutrition by targeting the production, consumption, knowledge and income pathways to improve nutrition. This dissertation examined the impacts and dynamics of a nutrition-sensitive program delivered through a community preschool platform in Southern Malawi. The NEEP program was designed to increase diet diversity and nutritional outcomes of targeted children of preschool age whose families were supported by agricultural inputs and nutrition knowledge at the household level and school meals at the CBCC level. This chapter summarizes conclusions from the parent study and from the three research papers contained in this dissertation. It then presents a synthesis of results, drawing lessons for implementation of nutrition-sensitive agriculture programs as well as contributions to the body of evidence and to policy.

The parent project found treatment effects on preschoolers' diet diversity and nutrient intakes and increases in household production of specific nutritious foods promoted by the NEEP program. Anthropometric outcomes were improved in younger siblings of preschool children in the program, with increases in height-for-age z-scores and lowered prevalence of stunting. However, these improvements in anthropometry were not seen in the preschool children themselves. Households increased production of specific program-promoted nutritious foods and improvements were also seen in caregiver nutrition knowledge, which was supported by the agriculture and nutrition trainings in the program (Gelli, Margolies, et al., 2018).

The first paper in this dissertation (Chapter 3) departed from the primary analyses of the parent project and further examined the dynamics of agriculture-nutrition pathways by focusing on household level food security. The first paper quantitatively measured food access and availability with the use of the widely used Household Food Insecurity Access Scale (HFIAS) and the

Household Diet Diversity Score (HDDS), as well as quantifying the severity of common coping strategies to deal with shocks. The results of this chapter showed that while the program did not have a significant impact on household measures of food security (HFIAS, HDDS), had a significant protective effect on treatment households during the lean season, lowering the severity of coping strategies used.

In the second paper (Chapter 4), in-depth qualitative methods were used to explore how resources which affect food security – and development aid in particular – are distributed, reallocated and negotiated at the village level. Findings from this study explored how social dynamics such as norms interact with kin relationships and local leadership to determine how resources are distributed and shared. Obligations, ethical beliefs and social pressure influenced if and when households shared resources with others. Moral economy dynamics affected sharing of development support, as all households were considered deserving of support. Norms around sharing practices were influenced by the type of resource and the origin of the resource. Different types of development programs garnered distinct patterns of redistribution. Programs such as NEEP which were designed around community welfare and mutual investment instead of individual targeting appeared to align well with local norms. These programs potentially diminish opportunities for resource diversion, as sharing was encouraged by design and leaders were less likely to coopt resources. Seasonality, an important factor in agricultural communities, also affected scarcity, affecting how households made decisions about sharing. Local chiefs, as the primary authority at the community level, were highly respected and expected to both attract and distribute resources to the village. This trust and dependence on leaders to manage resources occasionally resulted in the diversion of resources to the chief's kin or other forms of corruption. The pressures of land scarcity, urban migration and other cultural shifts created tensions between traditional, community-based mechanisms of social protection, and modern forms of external support such as development aid.

In the third paper of the series (Chapter 5), the role of women in the NEEP program was scrutinized to examine whether program participation added to the burden of care for female caregivers. In this context, gendered attitudes about the role of women in the household and the division of labor affected how women spend their time. Programs like NEEP that rely on women's voluntary labor could increase their labor, particularly when they are overburdened, such as during the lean season. Using a mixed-methods approach, we examined whether the NEEP program quantitatively increased women's caregiving, and what changes meant to women in a qualitative sense. The program significantly increased caregiving time for women participating in the program, however, this effect was only found during the lean season when CBCC-related scale-up investments were increased. The amount of increase in time spent in care was modest and were not considered burdensome by participants. In fact, these voluntary contributions were viewed as qualitatively important to participants as an investment in their children's development.

Synthesis: programmatic lessons and contributions to the literature

After synthesizing results of all three research papers, lessons emerged from an implementation perspective – in terms of the design, sustainability and measurement of nutrition-sensitive agriculture programs – as well as to contributions to the body of evidence.

There are several programmatic considerations that can be drawn from these results. First, nutrition-sensitive agriculture programs rely on agriculture, thus they should be “season-proofed” – or more explicitly incorporate seasonality by design. These considerations would improve potential impacts well as to avoid harm such as overburdening households during periods of high agricultural labor demand and food shortage. Although women in NEEP did not find their voluntary contributions to the program to be detrimental to their time burdens, implementers should be careful not to add to their workload or to reinforce existing gender disparities. Trainings and other time-consuming activities can be planned with seasonality in mind - to occur when households have

less agricultural work - and childcare could be provided to lessen the burden of care for female participants. The timing of agricultural inputs provided and support for maintenance of these inputs, such as in the case of seed saving and care for poultry, would extend the potential benefits of these components of the program and encourage sustainability beyond the duration of the intervention. For example, some households were unable to save seed from specific NEEP crops and instead consumed them during lean season hardship, precluding next year's planting. Diversifying household production can aid in sustainability but should also incorporate strategies to access water and to prepare for climate change to increase effectiveness over time.

Also, in this setting program implementers should be attentive to local social and cultural dynamics. Some traditions and norms have negative consequences, for example in the case of gender disparities. Implementers should ensure programs adhere to 'do no harm' principles while balancing respect for local norms, and encouraging positive changes such as expanding the roles of men in supporting childcare and developmental activities. A good possible entry point is deliberate inclusion of men on CBCC committees, which is more socially accepted for men than caregiving at the centers.

Traditions also sustain dependence on local leadership to manage external resources, which can result in inequitable outcomes. The role of local leaders is often underestimated and these power structures are important to understand in designing and implementing programs. Awareness of village-level political dynamics, program-driven monitoring and transparency mechanisms can aid in prevention of resource appropriation by local chiefs.

This research also offers important contributions to the evidence base on nutrition-sensitive agriculture programs: in terms of measurement of program success, the role of community-based interventions that value community contributions and institutions, and the importance of gender and sociocultural considerations.

Contributions of this research highlight the importance of considering measurement carefully in evaluations of nutrition-sensitive agriculture programs. As seen in the various conceptual models, nutrition-sensitive agriculture programs operate through multiple pathways of impact. Thus, the use of multiple indicators or mixed-methods approaches can be critical for accurate interpretation of results. It is essential to measure quantitative changes in food security status and nutrition, but understanding how or why these changes occur is enhanced by the explanatory power of qualitative methods. One example of the increased interpretive power of mixed methods is seen in Chapter 4, in which women's time spent in care in the treatment group was significantly increased during the lean season. The interpretation of these quantitative results might have suggested that the program was overburdening women during a critical season. However, upon further investigation of the perceptions of participating women, it was made clear that these changes were not qualitatively detrimental and, in fact, investments in program activities were highly valued.

Another contribution in terms of measurement was the forethought in the co-design of program implementation and evaluation. In this case, the NEEP program pilot was designed intentionally alongside a rigorous evaluation, which ensured that program implementation issues - in addition to outcomes - were well captured. Secondly, social context can affect both program performance and measurement. Cultural interpretations of what food security or other concepts mean affect how they are measured. For example, in Malawi, food security is considered to be dependent on whether the staple food is readily available ("maize as food"). Another example is how care work was not perceived as actual labor, which contributed to the underestimation of caregiving. Program performance can also be affected by norms, as in the case of inter-household or community sharing practices of food and other resources, which could have diluted program effects on household food security and diet diversity.

Finally, household measures may not capture improvements to individual nutritional status or diet quality. The allocation and utilization of nutritious foods at household level is critical to understand how programs may differentially affect members of a family unit – a unit which often exists beyond the boundaries of the physical home. The household may not always be a coherent unit by which to analyze change, depending on the cultural context of the program. Household-level may not make sense culturally, as kin units are not physically delimited to the structure of the home. Sharing practices revealed that changes in food security may be distributed beyond the nuclear family unit, leading to spillover effects that may not be well measured by conventional means such as a household survey. This poses issues for measurement and evaluation, for example, to whether the lack of impacts on food security at the household level in Chapter 3 can be understood as a result of sharing practices and community contributions encouraged by the program as described in Chapters 4-5. Therefore, attempts to measure the other levels at which change could be occurring – in this case at the CBCC level – is helpful to provide a more comprehensive picture on how resources are allocated, distributed, shared and ultimately, consumed. CBCC-level data was collected in the broader study and will be analyzed and presented in other work on the parent project.

Attention should also be paid to vulnerable subgroups that may not benefit from the intervention as much as other groups. This extends to individuals *within* the household, although this analysis demands further research. Accurate measurement and analysis is required to track differential impacts on these groups, as well as to measure individual nutritional status in addition to household measures (Harris & Aberman, 2018). Programs may affect household members differently. For example, it would be useful to investigate maternal nutrition and BMI as well as that of female adolescents to see if the energy demands of programs affected nutritional status.

Other contributions from this research suggest the benefit of the program approach through community-based institutions. Various nutrition-sensitive programs have seen mixed effects, but this

research suggests that an approach that utilizes community-based institutions – in this case, preschools, holds promise for stimulating positive change. The role of social capital was critical to the NEEP program design. CBCC committees, voluntary community participation and in-kind community contributions aided not only in sustainability but also in terms of community buy-in. That said, it is clear that provision of initial inputs is necessary in places where households have few resources to contribute. There is also evident value of strengthening extant community resources and institutions (CBCCs) and channeling programs through these local institutions rather than creating new systems of social interchange – which can supersede and undermine community resources and development.

Also, cultural and social dynamics heavily affect food and nutrition practices and are often overlooked in program design and implementation. Traditions and norms affect how programs function on the ground and influence success. Programs that align to norms or acknowledge them by design are able to capitalize on extant practices without generating social division or conflict.

Lastly, these results suggest there are missed opportunities for nutrition-sensitive agriculture programs to be gender-sensitive or gender transformative. This implies that gender considerations should be included as early as the design stage, to intentionally engage not just women, but also men in improving nutrition and dietary change. This is important especially because men often have control over household income. As seen in Chapter 4, some men exhibited controlling behaviors over food stocks. This behavior could prevent positive deviance by households in improving diets. Supporting men's engagement could lead to redoubled or longer-term payoffs in early childhood development and nutrition if men are more invested in children's development and dietary quality. Greater involvement by men in children's nutrition could also aid in slowly shifting gender norms that are restrictive to women's empowerment, particularly in terms of the balance of domestic and care responsibilities. Also, on a practical level, if agriculture and nutrition knowledge trainings are

provided as separate modules or components, it is more likely that they will continue to be gender divided - in that men can avoid nutrition content and attend only agriculture trainings. If these are truly integrated programs, then incorporating nutrition knowledge with agricultural techniques through curricula and trainings would be a natural way to engage men in nutrition.

Strengths and Limitations

This dissertation has several strengths that are important to note. First, the study design of longitudinal mixed methods - sequential explanatory qualitative methods paired with a randomized control trial - provided causal estimates of program impact as well as in-depth experiential and culturally-embedded insights. Longitudinal mixed-methods evaluation designs provide important contributions and insights to program implementation processes over time, particularly in agricultural contexts where seasonality is critical to livelihoods.

There are some limitations to this work which could have been improved upon. Seasonality would be better captured with additional data points, particularly during the post-harvest period when households have sufficient food. This would provide an important comparison to other seasonal data, in which only lean and non-lean seasons are compared. Examining the diversity of diet during a period when households have guaranteed food access is a good test of whether nutritious foods are being consumed and knowledge is applied when food preferences are easily met. Secondly, examining a longer timeline for the intervention would provide data on the sustainability of program impacts. This limitation is currently being addressed. In the parent study, a further round of data collection was conducted as a second year follow up in October-November 2017 with funding from the Gates Foundation. Although the intervention concluded after one year, the second-year data collection should provide insights to whether the effects persisted, particularly in terms of households' ability to continue to produce nutritious foods, maintain CBCCs meals, and in

retention and application of nutrition knowledge. Data are currently being analyzed by the research team at IFPRI. These results should aid in informing future policy at the country level.

Policy Implications

Many challenges remain to successfully implementing multi-sectoral nutrition programs, and nutrition-sensitive agriculture programs in particular. In order to successfully operationalize these efforts, greater collaboration between North-South actors must occur, pairing implementation efforts with research (Buchsbaum et al., 2016). The NEEP-IE research collaboration between Save the Children, IFPRI and local Malawian actors is an example of such a partnership. The program itself also represents an innovative design to addressing underlying causes of malnutrition by taking advantage of extant in country resources - community-based childcare centers. Results from the broader NEEP-IE trial have led to the Malawian Government to declare a commitment to expand the model to CBCCs around Malawi, funded by the World Bank.

A recent review and framework to inform the UN Decade of Action on Nutrition provides a helpful set of categories to organize the factors that drive commitments to nutrition: actors, institutions, political and societal contexts, knowledge, evidence and framing and capacities and resources (Baker et al., 2018). Applying Malawi's context to this framework, the country possesses powerful actors that support nutrition – including international organizations such as Save the Children and others, and officials in the GoM (MoGSW). Evidence has been provided by trials of nutrition-specific (Hurley et al., 2017; Thakwalakwa et al., 2010) and nutrition-sensitive (Bezner Kerr et al., 2011; Gelli, Margolies, et al., 2018) interventions. Financial commitments have been made by the World Bank to support the expansion of the NEEP model across the country through CBCCs. Based on our results, that areas most likely to cause obstacles to success are institutions and the political/societal context – to which environmental context should also be added as a constraint to the agricultural component of the program. On the socio-political end, local or national leaders

could manipulate or coopt the program to their own benefit. Alternatively, social dynamics could also serve to support the success of the program if communities are highly invested and they continue to provide contributions over time. Institutions are also a weakness in this context, with the challenge of CBCCs to be operational, effective platforms for the program nationwide.

On the positive side, interest by the GoM in nutrition-sensitive programs such as NEEP indicates a shift away from policies of “food centrism”, in which malnutrition is simply understood as a lack of food, or maize in this context. This is a promising development for international partners and those in GoM who are motivated to prevent future cycles of malnutrition and food insecurity in Malawi. While this is an exciting advance, there is an ongoing need for continued evaluation and accompaniment of the program as it is expanded throughout the country. This should include continued identification of process issues that could lead to improvements in effectiveness, in order to maintain an ongoing cycle of evaluation, monitoring and learning. This research highlighted important contextual factors such as cultural practices and norms, which differ by region of the country and pose challenges to the program’s future success. Further, environmental conditions, access to land, land tenure and regular CBCC operation are all factors that will prove logistically or programmatically challenging for implementation and sustainability. Hopefully, the insights provided here and in other research on this program can aid in this ongoing process and ensure the future success of a national program.

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- Zanello, G., et al. (2017). Piloting the use of accelerometry devices to capture energy expenditure in agricultural and rural livelihoods: Protocols and findings from northern Ghana. *Development Engineering*, 2, 114-131.

Curriculum Vitae

Amy Elliott Margolies

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Public health specialist with 9+ years international research experience on social protection, food security, nutrition; quantitative, qualitative and mixed methods research. Fieldwork conducted in Latin America (Brazil, Guatemala, Peru, Ecuador, Mexico), Sub-Saharan Africa (Ethiopia, Uganda, Guinea-Bissau, Malawi), Asia (Bangladesh, India, E. Timor).

EDUCATION

PhD Candidate, 2014-18 Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
Master of Arts, 2009 Fletcher School of Law & Diplomacy, Tufts University, MA
Bachelor of Arts, 2004
Macalester College, MN

PROFESSIONAL EXPERIENCE

International Food Policy Research Institute, Poverty, Health and Nutrition Division, Washington, D.C
2015-Present

Research Consultant

- Co-PI for randomized control trial (RCT) on a nutrition-sensitive agriculture program
- Compiled questionnaires, worked with firm to program tablets for data collection
- Conducted baseline and end line enumerator survey training, organized and implemented field tests
- Designed three qualitative studies and drafted instruments
- Led 6-person team for household qualitative data collection in Malawi
- Coded and analyzed qualitative data, drafted reports, policy note and papers for publication

International Food Policy Research Institute, Poverty, Health and Nutrition Division, Washington, D.C
2013- 2014

Senior Research Analyst

- Acted as interim project manager for ICT - Nutrition study in India: aided in drafting protocol and instruments, prepared ethics review, interviewed firms, conducted fieldwork and analyzed data with NVivo
- Developed design, instruments, conducted focus groups and key informant interviews for a qualitative study on the Productive Safety Nets Program (PSNP) impact on adolescent schooling, time use and labor in Ethiopia
- Trained survey team, monitored fieldwork, conducted data analysis and drafted chapters for an ethnographic study of a conditional cash transfer program (*Programa Juntos*) in indigenous communities in Peru
- Drafted papers for publication on costing transfers, gender dynamics of a cash transfer program
- Conducted cost analysis in a 5-treatment arm RCT for the Bangladesh Transfer Modality Research Initiative

International Food Policy Research Institute, Poverty, Health and Nutrition Division, Washington, D.C.
2011 – 2013

Research Analyst

- Conducted comparative cost effectiveness analyses for impact evaluation of the World Food Program's (WFP) cash, vouchers and food assistance programs in Ecuador, Uganda and Yemen
- Designed and conducted qualitative field study on nutrition behavior change in social transfer program in Ecuador
- Trained enumerators, managed fieldwork for USAID Feed the Future's Women's Empowerment in Agriculture Index pilot in Guatemala (WEAI)
- Supported operations research for Guatemala PM2A nutrition program

International Food Policy Research Institute, Poverty, Health and Nutrition Division, Washington, DC
2010 – 2011

Congressional Hunger Fellow

- Conducted cost effectiveness analyses for WFP study on cash, vouchers and food in Ecuador, Uganda and Yemen
- Drafted questionnaires, trained enumerators, and managed fieldwork for household survey in Ecuador

National Fund for Educational Development (Ministry of Education), Brasilia, Brazil
2009 – 2010

Congressional Hunger Fellow, Brazilian National School Feeding Program

- Conducted on-site evaluations of school meals program implementation in 5 Brazilian municipalities
- Developed proposal to restructure M&E in the school meals program, created and facilitated working group
- Designed and conducted fieldwork for a 2-month study (8 municipal cases) on the National School Meals program
- Aided in drafting school meal guidelines on Brazilian technical mission to Bolivia
- Co-facilitated strategic planning workshop with the Bolivian Ministry of Education

Bankable Frontier Associates, Consumer Experience with Branchless Banking, Brazil
11/2009

Research Consultant

- Selected sites for field test of survey on financial inclusion
- Conducted stakeholder interviews, collected feedback and adapted questionnaire design
- Drafted report on field test results and collaborated on survey adaptation in English and Portuguese

CMPartners/World Bank, Leadership and Communication Capacity for National Renewal, East Timor
Winter 2009

Monitoring and Evaluation Consultant

- Drafted study protocol and instruments for midterm program assessment
- Interviewed program participants and key stakeholders

- Analyzed data and produced final evaluation report

United Nations Development Program, Bureau for Crisis Prevention and Recovery, Guinea-Bissau
Summer 2008

Summer Fellow, Harvard Law School Program on Negotiation

- Launched “Youth for a Culture of Peace in Guinea-Bissau” project, designed M&E framework
- Co-facilitated the National Workshop on Engendering the Strategic Framework for Peacebuilding
- Wrote proposals for UNDP and UN Peacebuilding Commission
- Drafted and conducted in-depth interviews with stakeholders, analyzed data for thesis project

Partners for Democratic Change, Washington, DC

Summer 2007

Intern

- Created participatory planning exercises for UNDP Yemen
- Designed course materials for World Bank trainings for internal conflict resolution system
- Assisted in the implementation of a 40-hour Mediation in Spanish course
- Developed materials for Organization of American States’ “Gender and Conflict” online course

Viva Rio, Public Security and Human Rights Program, Rio de Janeiro, Brazil

2004 – 2006

Project Coordinator, Center for Legal Assistance and Community Mediation

- Designed survey, coordinated team and analyzed data
- Managed staff to provide services in two favelas, facilitated trainings/outreach

PEER-REVIEWED PUBLICATIONS

Gelli, A., **Margolies, A.**, Santacroce, M., et al. (2018). Using a community-based early childhood development center as a platform to promote production and consumption diversity increases children's dietary intake and reduces stunting in Malawi: A cluster randomized trial. *Journal of Nutrition*, 148.

Gelli, A., **Margolies, A.**, Santacroce, M., et al. (2017). Improving child nutrition and development through community-based childcare centers in Malawi – The NEEP-IE study: study protocol for a randomized controlled trial. *Trials*, 8 (284). <http://rdcu.be/tAfN>.

Gelli, A., Aberman, N., **Margolies, A.**, et al. (2017). The impact of lean season food transfers on food security, diets and nutrition status of young children in Malawi. *Journal of Nutrition*. <http://jn.nutrition.org>.

Kadiyala, S., Morgan, E., **Margolies, A.**, Cyriac, S., and Roopnaraine, T. (2016). Promoting Maternal, Infant and Young Child Nutrition Behavior Change through the Digital Green Video Extension Approach. *PLoS One*. <http://journals.plos.org>.

Margolies, A. and Hoddinott, J. (2015). Costing Alternative Transfer Modalities. *Journal of Development Effectiveness*, 7(1): 1-16. <http://www.tandfonline.com>.

Hidrobo, M., Hoddinott, J., Peterman, A., **Margolies, A.**, and Moreira, V. (2014). Cash, Food or Vouchers? Evidence from a Randomized Experiment in Northern Ecuador. *Journal of Development Economics*, 107:144-156. <http://www.sciencedirect.com>.

BOOK CHAPTERS

Roopnaraine, T., Correa, N., **Margolies, A.** (2018). Conditional Cash Transfer Program Implementation and Effects in Peruvian Indigenous Contexts. *Cash Transfers in Context: An Anthropological Perspective*. Eds. De Sardan, J.P., Piccoli, E. <http://www.berghahnbooks.com>.

Margolies, A. and Hoddinott, J. (2014). Mapping the Impacts of Food Aid: Current Knowledge and Future Directions. *Food Security. Vol. 4: Food Policy for Food Security*. Ed. Mark Rosegrant. Sage Publications: SAGE Library of International Security. <http://www.uk.sagepub.com>.

POLICY NOTES

Margolies, A., Kalagho, K. and Kazembe, C. (2018). Examining Perceptions of Food Assistance on Household Food Security and Resilience in Malawi. Malawi Strategy Support Program (MaSSP) Policy Note 32, IFPRI.

Margolies, A., Aberman, N & Gelli, A. (2017). Traditional leadership and social support in Southern Malawi. Malawi Strategy Support Program (MaSSP) Policy Note 30, IFPRI. <http://massp.ifpri.info/2017/10/31/>.

WORKING PAPERS

Margolies, A., Kalagho, K. and Kazembe, C. (2018). Examining Perceptions of Food Assistance on Household Food Security and Resilience in Malawi. Malawi Strategy Support Program Working Paper 24. IFPRI.

Gelli, A., Donovan, J., **Margolies, A.**, et al. (2018). The role of food systems and value chains to improve diets in low-income settings: Diagnostics to support intervention design in Malawi. IFPRI Discussion Paper 01732. <http://www.ifpri.org>.

Margolies, A. and Hoddinott, J. (2014). Costing Alternative Transfer Modalities. International Food Policy Institute Discussion Paper Series 01375. International Food Policy Institute (IFPRI). <http://www.ifpri.org>.

Hidrobo, M., Hoddinott, J., Peterman, A., **Margolies, A.**, and Moreira, V. (2012). Cash, Food or Vouchers? Evidence from a Randomized Experiment in Northern Ecuador. International Food Policy Research Institute Discussion Paper 01234. <http://www.ifpri.org>.

Margolies, A. and Hoddinott, J. (2012). Mapping the Impacts of Food Aid: Current Knowledge and Future Directions. WIDER Working Paper WP/034 United Nations University - World Institute for Development Economics Research. <http://www.wider.unu.edu/publications>.

PAPERS IN PROGRESS

Gelli, A., Nguyen, P., Santacrose, M. et al. (Mimeo). A community-based early childhood development center platform promoting diversified diets and food production improves the adequacy of nutrient intake of pre-school children in Malawi: A cluster randomized trial.

Gelli, A. Daryanani, R, **Margolies, A.**, Twalibu, A., Levin, C. (Mimeo). When communities pull their weight: The economic costs of an integrated agriculture and nutrition, home-grown preschool meal intervention in Malawi. IFPRI.

Margolies, A., Roopnaraine, T., Correa, N. (Mimeo). Pressed for Cash: Gender, Obligation and Empowerment among Indigenous communities in a Conditional Cash Transfer Program in Peru. IFPRI/PUC-Peru.

REPORTS AND OTHER PAPERS

Duchoslav, J., Kalagho, K., Kazembe, C., Margolies, A. (2018). Inter-Household Sharing of Humanitarian Aid in Rural Malawi. IFPRI Malawi/DFID Report.

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Margolies, A. and Aberman, N. (2016). Nutrition and Value Chains during the Lean Season in Malawi: Consumption, Marketing and Gender. Innovative Methods and Metrics for Agriculture and Nutrition Actions (IMMANA): Leveraging Value Chains to Improve Nutrition, Leverhulme Center for Integrative Research on Agriculture & Health (LCIRAH)/IFPRI.

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Ahmed, A., Hoddinott, J., Roy, S., Sraboni, E., Quabili, W., **Margolies, A.** (2016). Which Kinds of Social Safety Net Transfers Work Best for the Ultra-Poor in Bangladesh? Operation and Impacts of the Transfer Modality Research Initiative. IFPRI/WFP Report.

Roopnaraine, T., **Margolies, A.**, Cyriac, S., Kadiyala, S. (2014). Promoting Maternal, Infant and Young Child Nutrition Behavior Change through Digital Green Video Extension Approach: A Feasibility Study. IFPRI/SPRING-USAID. www.spring-nutrition.org.

Hoddinott, J., Gilligan, D., Hidrobo, M., **Margolies, A.**, et al. (2013). Enhancing WFP's Capacity and Experience to Design, Implement, Monitor and Evaluate Vouchers and Cash Transfer Programmes: Study Summary. IFPRI. www.cashlearning.org.

Schwab, B., **Margolies, A.** and Hoddinott, J. (2013). Impact Evaluation of Cash and Food Transfers for the Seasonal Emergency Safety Net in Hajjah and Ibb Governates, End line Report, Yemen. WFP/IFPRI. <http://documents.wfp.org>.

Gilligan, D., **Margolies, A.**, Roy, S and Quiñones, E. (2013). Impact Evaluation of Cash and Food Transfers at Early Childhood Development Centers in Karamoja, Uganda. WFP/UNICEF/IFPRI. <http://documents.wfp.org>.

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Margolies, A. (2009). Peacebuilding and Anti-Corruption: Room for Collaboration? New Routes, 14: 34-37. <http://www.life-peace.org/700/>.

Margolies, A. and Gao, Y. (2009). Transboundary Water Governance in the Volta River Basin. Aquapedia Water Resource Database, Tufts University. <https://wikis.uit.tufts.edu>.

PRESENTATIONS

“Value chains for nutrition.” IFPRI/LANSA Workshop. Agriculture, Nutrition and Health (ANH) Scientific Symposium & Academy Week. July 10, 2017. Co-facilitated with M. Morales, Institute for Development Studies (IDS).

“Harnessing markets for improved nutrition: A case study of Zomba.” MaSSP Brownbag Seminar Series. IFPRI/Lilongwe. February 14, 2017. In collaboration with N. Aberman, A. Gelli, and J. Donovan.

“Gender, Obligation and Empowerment among Indigenous communities in a Conditional Cash Transfer Program Juntos in Peru.” Rethinking Race and Economics Panel, Latin American Studies Association Conference, Chicago, May 22, 2014.

“Making Foreign Aid Go Further: Supporting Markets through Local and Regional Procurement (LRP): Cash, Food or Vouchers? Evidence from a Four Country Study.” U.S. Capitol Congressional Center, Washington DC, Feb. 25, 2014.

“Indigenous Communities and Conditional Cash Transfer Programs: An Ethnographic study on the Implementation and Socio-cultural Impacts of the JUNTOS Program in Andean and Amazonian Communities in Peru.” IDB/MSID/PUC, Peru, Nov. 14, 2013.

“The Effectiveness of In-kind, Cash and Voucher transfers in Food Assistance,” WFP-IFPRI Seminar, Rome, Italy, May 23, 2013.

“Cash, Food or Vouchers? Evidence from Ecuador and Uganda.” Latin America & Caribbean Nutrition Seminar Series, World Bank, Washington, D.C., April 18, 2013.

“The Importance of Gender in Linking Agriculture to Sustained Nutritional Outcomes.” Agriculture and Nutrition Global Learning and Evidence Exchange, USAID/SPRING, Guatemala City, Guatemala, March 6, 2013.

“WFP/UNICEF/IFPRI Impact Evaluation on Cash and Food Transfers: Cost Analysis.” WFP Research Dissemination Event, Kampala, Uganda, January 15, 2013.

“South-South Cooperation in Practice: Brazil’s Influence on Food Security in Sub-Saharan Africa.” The Fletcher School of Law and Diplomacy Doctoral Conference, Tufts University, September 28, 2012.

“Piloting and Development of the Women’s Empowerment in Agriculture Index.” Congressional Hunger Center, Washington, D.C. July 25, 2012.

“Costing, cost effectiveness and qualitative results for the WFP-IFPRI Impact Evaluation on Cash, Food and Vouchers in Northern Ecuador.” WFP Research Dissemination Event, Quito, Ecuador. May 2012.

“Local purchase for all? School Feeding and Smallholder Agriculture in Northeast Brazil.” World Nutrition Conference, April 27-30, 2012, Rio de Janeiro, Brazil.

“Monitoring and Evaluation in the National School Feeding Program.” Workshop, The Brazilian National School Feeding Conference, November 18, 2010, Salvador, Brazil.

POLICY RELEVANCE

Study on Approaches to Assess Cost-Effectiveness of DG-ECHO’s Humanitarian Aid Actions: Final Report.” (2017). Directorate-General for European Civil Protection and Humanitarian Aid Operations (ECHO), European Civil Protection and Humanitarian Aid Operations (ECHO) (European Commission). (*2 co-authored papers cited*).

International Cash-Based Food Assistance. (2016). United States Government Accountability Office, Report to the Chairman, Committee on Foreign Relations, U.S. Senate. <http://www.gao.gov>. (*6 co-authored papers cited*).

Global Food Policy Report. (2013). Safety Nets with Impact: Cash, Food or Vouchers? International Food Policy Research Institute (IFPRI), Washington, D.C. (*1 co-authored paper cited*)

MEDIA CITATIONS

Margolies, A. and Hoddinott, J. (2014). Costing Alternative Transfer Modalities. *Journal of Development Effectiveness*, 7(1):1-16.

- Cited in the *Atlantic* (12/29/16); *New York Times* (9/13/16); *Guardian* (1/22/16); *The Economist* (9/26/15).

Hidrobo, M., Hoddinott, J., Peterman, A., Margolies, A., and Moreira, V. (2014). Cash, Food or Vouchers? Evidence from a Randomized Experiment in Northern Ecuador. *Journal of Development Economics*, 107:144-156.

- Cited in the *Atlantic* (9/25/15); *World Economic Forum* (6/24/16; 4/19/16); the *World Bank Blog* (7/30/14); *Economist* (2/22/14); *Freakonomics blog* (11/19/13); *Voice of America* (10/28/13).

AWARDS

- ❖ Tuition Scholarship, International Health, 2014-2018, Johns Hopkins School of Public Health
- ❖ Doctoral Award, Health Systems Program, 2015-2016, Johns Hopkins School of Public Health
- ❖ Health Systems Program Scholarship, 2014-2015, Johns Hopkins School of Public Health
- ❖ Mickey Leland International Hunger Fellowship, 2009-2011, Congressional Hunger Center
- ❖ CV Starr Scholar, 2008-2009, Fletcher School of Law and Diplomacy
- ❖ Project on Negotiation Summer Fellowship, 2008, Harvard Law School
- ❖ Leir Humanitarian Fellowship, 2008, Fletcher School of Law and Diplomacy
- ❖ Sigma Delta Pi National Collegiate Hispanic Honor Society, 2004, Macalester College

BOARD SERVICE

Puente a la Salud Comunitaria (Bridge to Community Health), Oaxaca, México

2013-Present

Board of Directors, Monitoring & Evaluation Specialist

- Provided technical advice and capacity building to an NGO focused on amaranth production and consumption

Potomac Highlands Food and Farm Initiative, Davis, West Virginia

2017-Present

Advisory Board Member

- Provided technical and editorial support to a Community Food Project application to NIFA-USDA (2018)

REFeree SERVICE

Institute of Development Studies (IDS) Bulletin; Health Policy & Planning

ACTIVITIES

Musician, Batalá - Washington, D.C., Afro-Brazilian percussion band 2011-2014

Opened Rolling Stones 50th Anniversary Tour at Barclays Center, Brooklyn, NY, 12/8/2012

Senior Editor, Praxis Journal for Human Security, The Fletcher School, Tufts University 2008-2009

TEACHING

Teaching Assistant, Johns Hopkins Bloomberg School of Public Health, MPH/PhD courses:

Introduction to Humanitarian Emergencies; Health Behavior Change at the Individual, Household and Community Levels; Health Systems Research & Evaluation in Low and Middle-Income Countries; Health Systems Seminar.

PERSONAL

Languages: English (Native), Portuguese (Native Proficiency), Spanish (Fluency), Portuguese Creole (Basic), French (Basic)

Software: STATA, NVivo, Atlas.ti, Microsoft Office

Citizenship: United States